THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. XC. No. 2191.] LONDON, MAY 9, 1905. [57TH YEAR. PRICE 6d.

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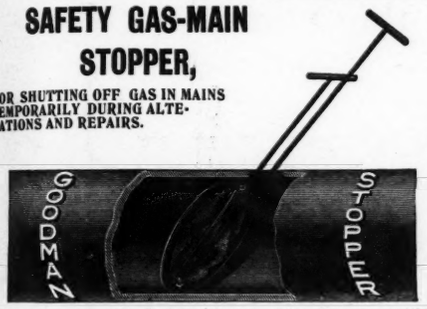

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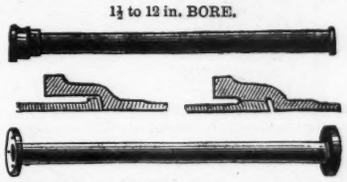

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Fuel used from Dec. 9 to Dec. 16: Coke	£	s.	d.
dust—41 tons 4 cwt., at 1s. 11d. .	3	19	0
Washed slack—15 tons 17 cwt., at 6s. 6d.	5	3	2
	£9	2	2

This works out at a fraction under 2s. 4d. per 1000 gallons. Can this result be beaten? I may add that the water-feed to the boilers is heated by the exhaust steam from the engines to 200 deg.

Yours truly,
C. D. LENG.

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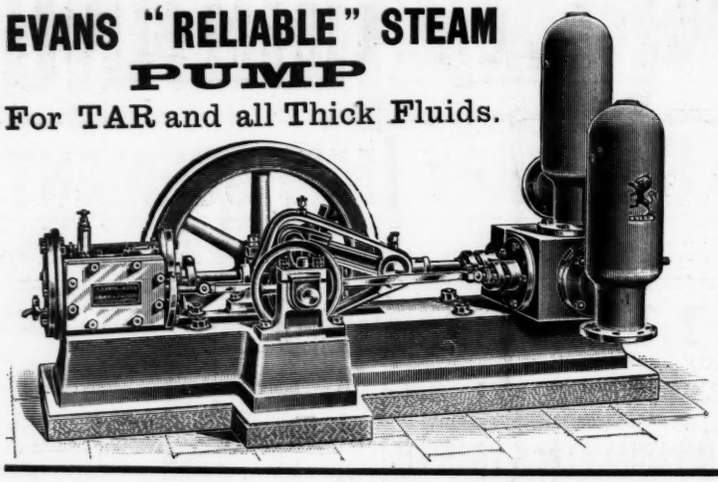

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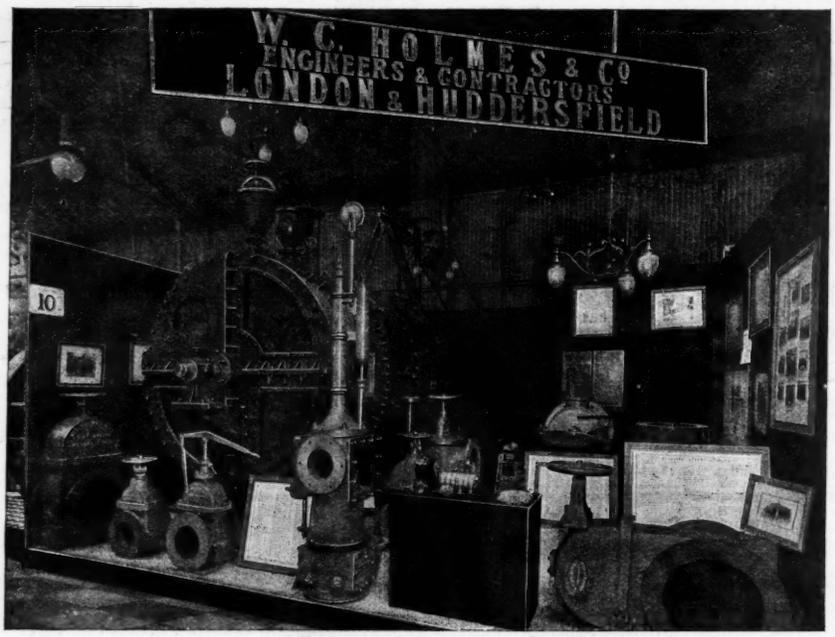

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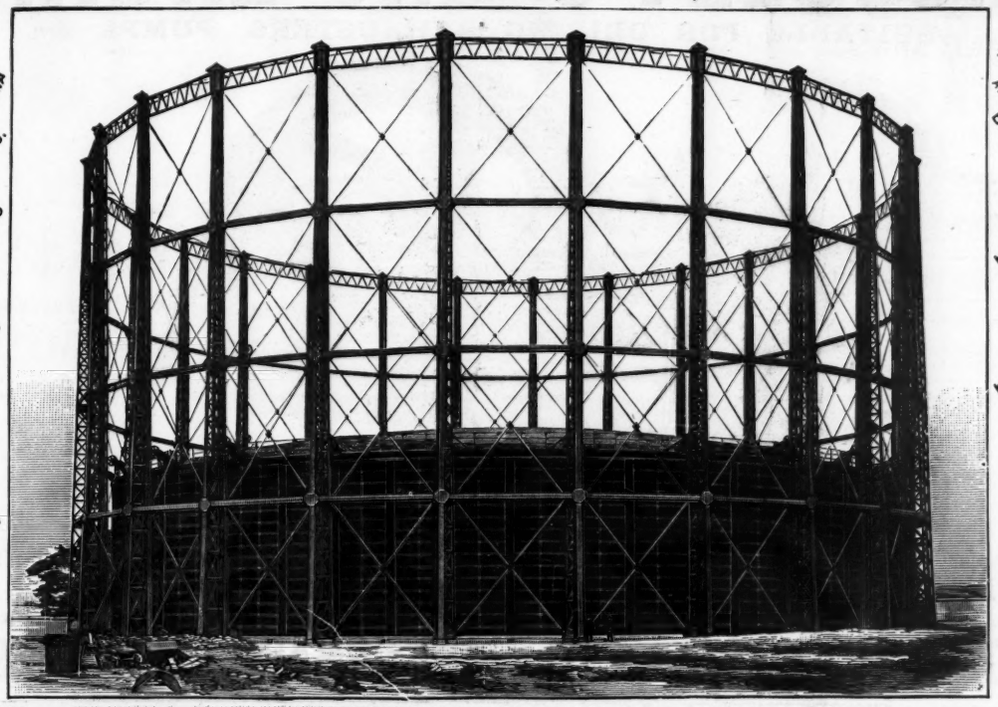

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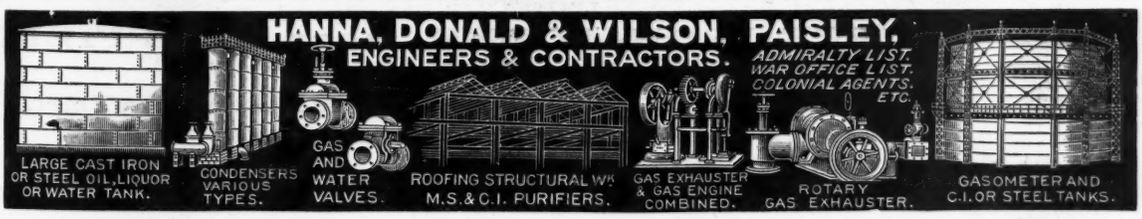
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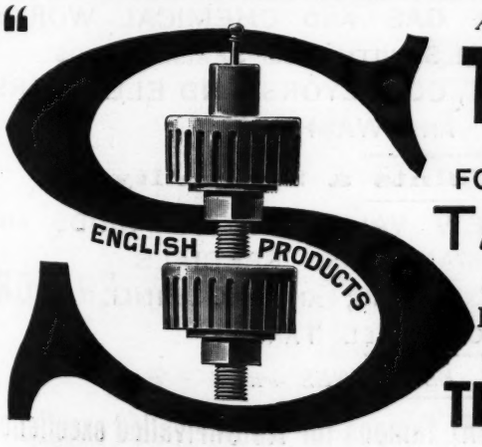

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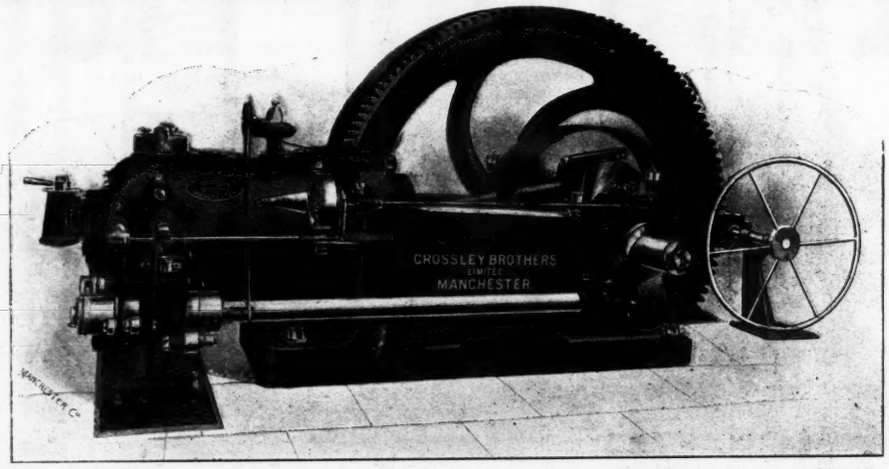

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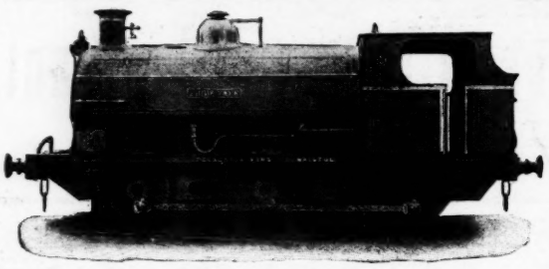

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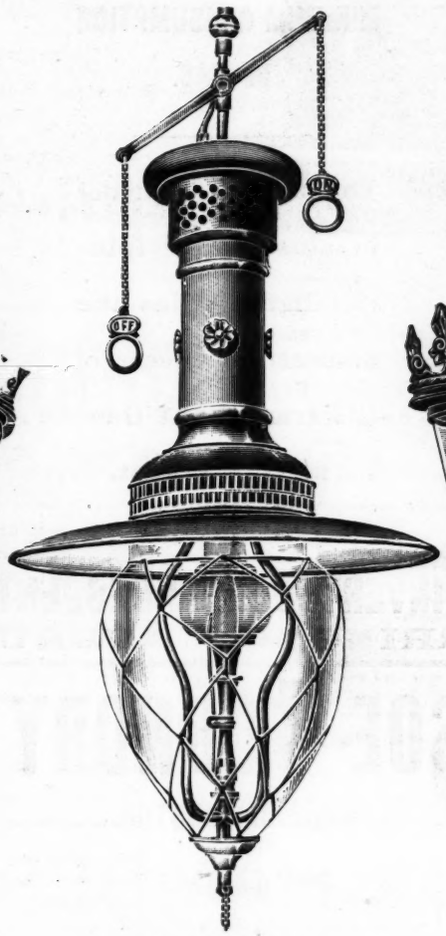

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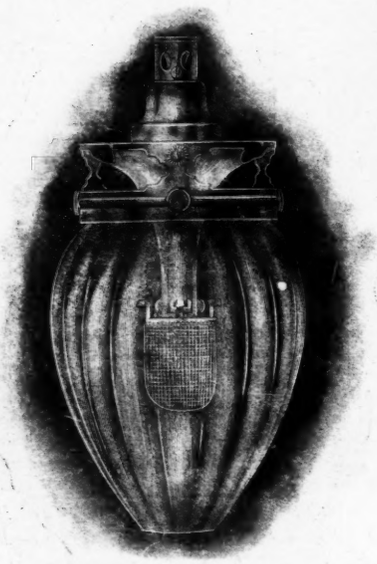

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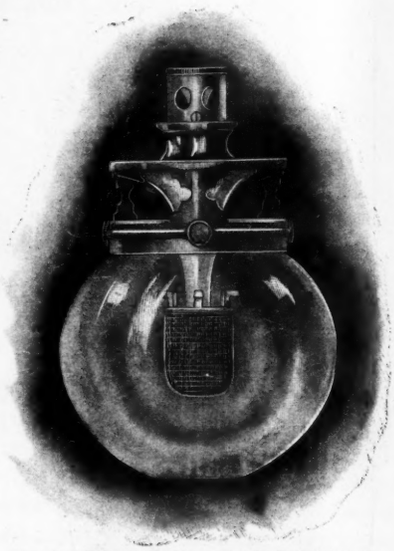

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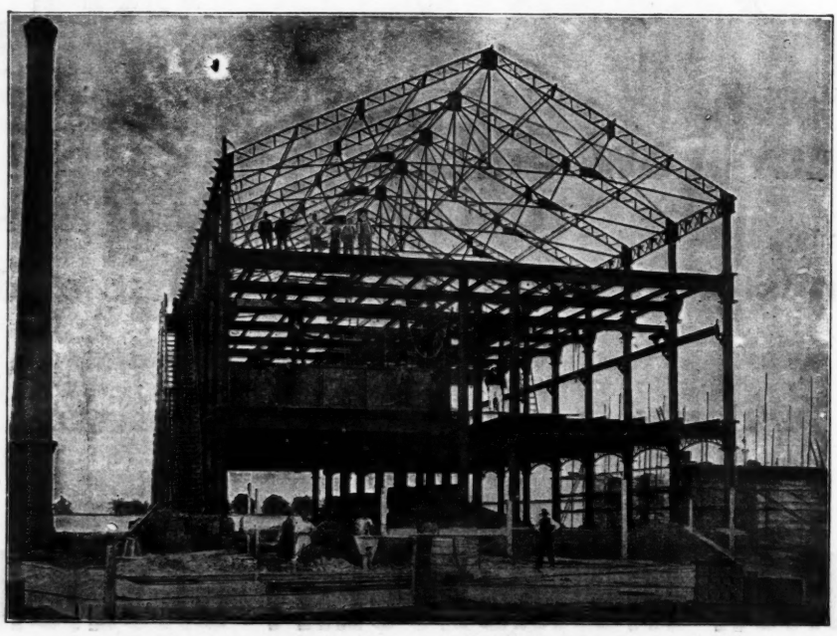

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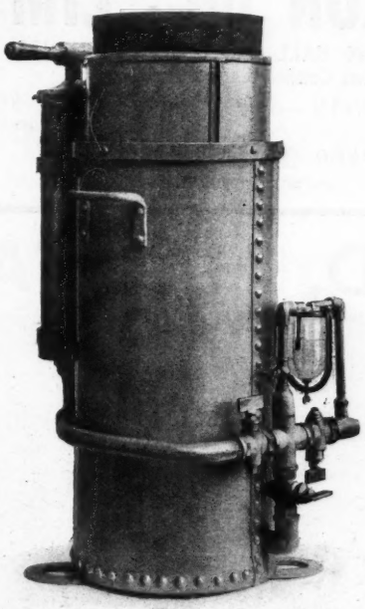

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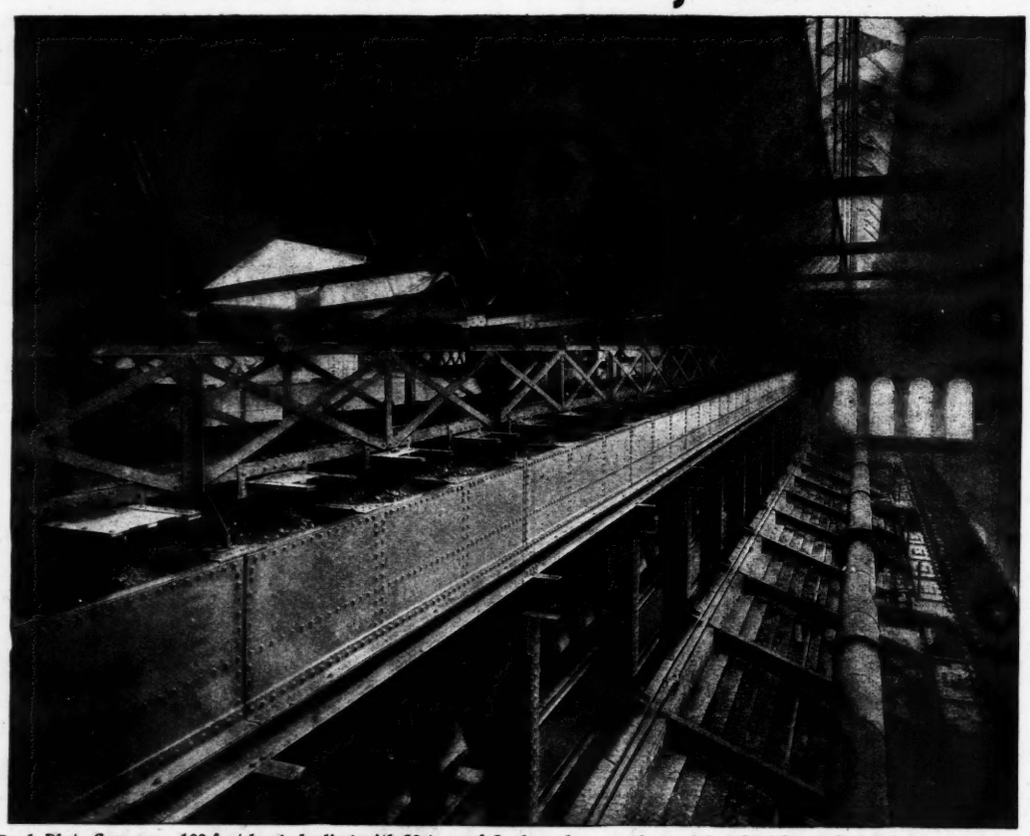

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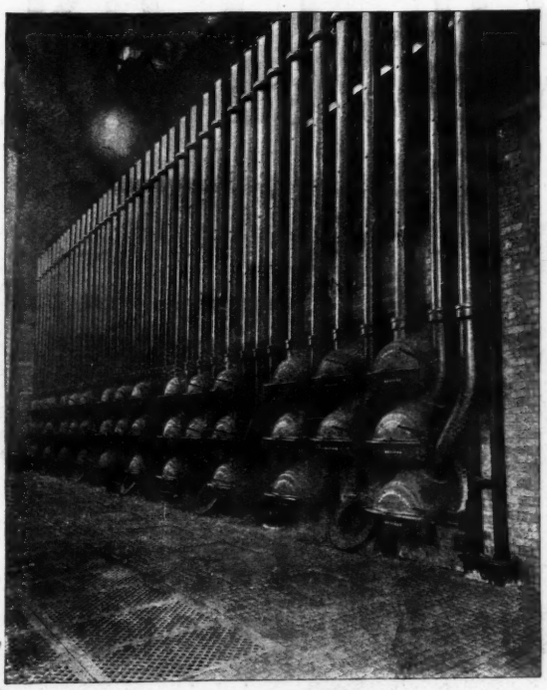

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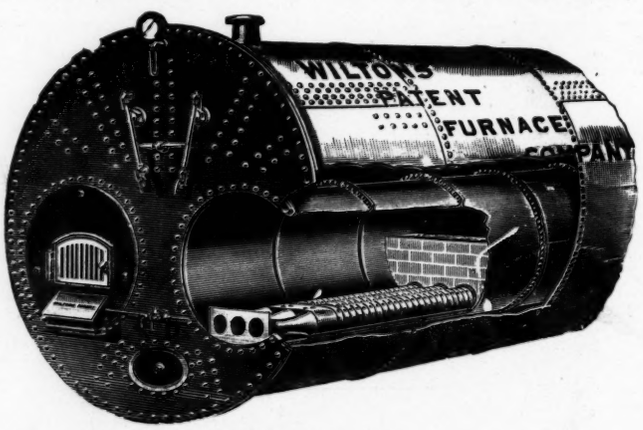

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CONTENTS.

EDITORIAL NOTES.

GAS, &c.—

The Making of a Successful Gas Man . . 353
Gas Displaces Electric Lamps in City Streets 353
Responsibility of Gas Undertakings for Reinstatement of Roadways 354
Imperial Continental Gas Association . . 354
Tramway Construction and Interference—Prosperity at Southampton—Halifax and its Tar-Works—Coal Contracts at Stockport—In the Cause of Household Good—Scottish Trade Unionists in Congress . 355

ESSAYS AND REVIEWS.

Gas Stock and Share Market 357
Electric Lighting Memoranda 357
The Labour Party in Australia 359
Gas Distribution Systems—The Liability of Corporations and Tramway Companies . 359
Optical Pyrometry 360

COMMUNICATED ARTICLE.

Enterprise at Truro and the Inventor of Gas Lighting. By a Correspondent 362

TECHNICAL RECORD.

The Besemfelder Process for the Direct Gasification of Coal 363
Progress in Gas Manufacture in England and America 364
The Efficiency and Practical Importance of Common Sources of Light. By Professor W. Wedding 366
The Coal Tar Colour Industry 367
Visit of Scottish Juniors to the Provan Gas-Works 368

LEGAL INTELLIGENCE.

High Court of Justice—King's Bench Division—Graham, Morton, and Co. *v.* Compagnie L'Union des Gaz. 372
Thames Police Court—Poplar Borough Council *v.* Commercial Gas Company. . . . 377
Incandescent Gas-Lamp Litigation . . . 378

REGISTER OF PATENTS.

Gas Heating Burners—Onslow, A. W. . . 369
Weaving the Mantle Fabric of Incandescent Gas-Burners—Thomas, G. 369
Rotating Gas Washer-Scrubbers—Smith-Rewse, H. S. 369
Generating Combustible Gas from Hydrocarbonaceous and Other Fuel—Thwaite, B. H. 369
Patent Notices 370

CORRESPONDENCE.

The Institution of Gas Engineers and Gas-Testing 370
From Non-Statutory to Statutory Condition 370
Street-Lamp Tests by the National Physical Laboratory 371
The Mechanical Handling of Material. . . 371
Spencer's Verticle Hurdle Grid 371
Gas Companies' Secretaries and the Chartered Institute 371

PARLIAMENTARY INTELLIGENCE.

Progress of Bills 371
Committee on Unopposed Bills—Hessle Gas Bill 371

MISCELLANEOUS NEWS.

Public Lighting of the City of London—Gas Supersedes Electricity; The City Engineer's Report 378
The Public Lighting Question in New York—The Legislative Investigation. 379
Examinations in Gas Manufacture—The City and Guilds and Polytechnic Question Papers 380
Imperial Continental Gas Association. . . 381
Buenos Ayres (New) Gas Company, Limited 382
Bombay Gas Company, Limited 383
Southampton Gas Company. 384
A Review of the Welsbach Company's Position 385
Halifax Corporation Tar Works—Proposal to Discontinue Operations 386
The Gas Extensions at Nottingham . . . 386
Cheaper Gas for Manchester 387
Decreased Sales, Larger Profits, at Rotherham 387

MISCELLANEOUS NEWS (*continued*)—

Gas Exhibitions and Cookery Demonstrations 387
Notes from Scotland 389
Current Sales of Gas Products 390
Coal Trade Reports 391
Trade Notes 392

PARAGRAPHS.

Deposit of Tender Forms—Bruce Peebles and Co., Limited 357
Effects of Electrolysis—Manchester District Institution of Gas Engineers—North British Association of Gas Managers 360
New Coal Handling and Crushing Plant for Bristol—Self-Reliance in Workmen . . . 361
Tracing Gas-Mains for Leakage 362
Personal and Obituary 363
Recent Wills—"Gas-Engines and Producer-Gas Plants"—Coke Production in India . 363
Sale of Shares—Gas-Meter Testing in Middlesex 370
West Bromwich Gas Supply—New Pipe-Line to Brighouse 378
Smaller Gas Profit at Wigan—Huddersfield Gas and Water Supply. 380
Gas Company Fined for Neglecting to Furnish Returns — Steam-Rollers and Fractured Pipes—Yeovil Gas Supply 388
Projected Water-Works Extension at Burnley 390
The Condition of the Cleveland Water Supply—Finances of the Manchester Water Department—Paignton Water-Works Loan—Collapse of a Reservoir at Madrid . . . 392
Stafford Corporation Water Supply—Thefts from Prepayment Meters in Unoccupied Houses—"As a Going Concern"—Coal Contracts at Stockport—Quality of the Llanelly Gas—Sunderland and South Shields Water Bill—A Small Increase in Consumption at Carnarvon — Manchester Water Supply 393
Kimberley Water-Works Company, Limited—Southport Corporation Gas Supply—Plymouth Gas Company and the Municipal Electricity Works—Winsford Gas Supply—Mr. R. A. Browning and the Pontardawe Gas-Works 394

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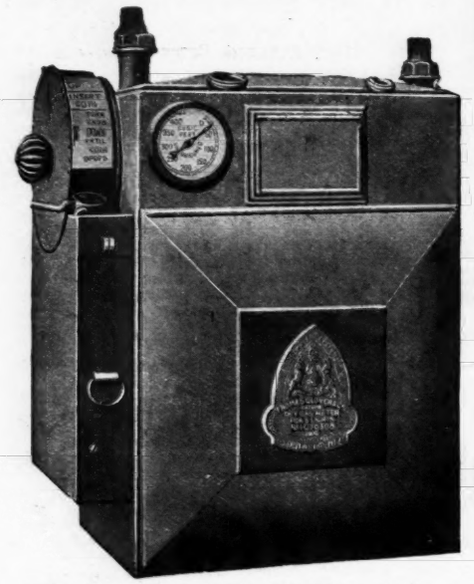

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EDITORIAL NOTES—GAS, &c.

The Making of a Successful Gas Man.

THIS is a subject which has attractions for all, and has been frequently debated, though without any very definite conclusions having been arrived at regarding it. There is, however, a pretty general feeling that things are not exactly as they ought to be, and that a greater amount of care and preparation in the education and training of the future gas manager or engineer than has hitherto been bestowed is needed, in order that he may be able to cope with the new conditions with which he is confronted in these days of competition and new methods. So long as gas had the field to itself, as the only distributed source of heat and light, the management of a gas-works was a comparatively easy matter. But electricity on the one hand, and oil on the other, have changed this; and it is now a fight—if not for very existence, at all events for the maintenance of position. More than ever, therefore, the gas manager requires to be not only a man of mettle and resource, but he must have the commercial instinct strongly developed within him. There must be no standing upon dignity when it comes to be a question of securing new customers; he must go, metaphorically speaking, cap in hand, to all and sundry, if he would arrest the progress of his insidious rivals. Nor, so long as honourable means are pursued, is there in reality any loss of dignity in such a course. There is, on the contrary, dignity in labour of whatever kind; and he who does not labour, neither shall he eat. It is satisfactory to know that this commercial spirit is now increasingly apparent among gas managers; and its importance can hardly be too strongly insisted upon. Mr. F. W. Stone, in the course of his short but pithy address to the members of the Ohio Gaslight Association which we recently noticed, quoted the opinion of a leading gas man that, "given the choice of two men—one who could make "friends with people and increase sales, or one with tech- "nical training who could economize and reduce costs of "manufacture—the first would be the best selection as a "manager."

This opinion may be regarded as expressing the extreme importance in these days of seeking for customers, instead of, as of old, leaving them to seek you. It is, however, unnecessarily exaggerated, because under no circumstances is the mere commercial man to be preferred to one with technical training. The evils resulting from such a choice have but too frequently been made apparent in this country, and instances of them are not wanting even now. It is, however, more generally recognized now than formerly, that for the real head of a gas undertaking—whether he be Chairman, Engineer, or Manager—a technical training is the indispensable qualification. This, indeed, is apparent, from the marked success of undertakings which have enjoyed for any length of time the undisputed supremacy of technical heads. It may, in fact, be regarded as indisputable that, as a general rule, the full measure of success cannot otherwise be attained by a gas undertaking. This, however, is not to assert that the commercial element is of necessity to be subservient to technical proficiency. On the contrary, it is a happy combination of the two in the same individual that is required; and the question is, How can this be secured? Mr. Stone laments that there is no course of education that will produce a good gas man. By this he probably means that there is no course of education which is specially adapted for the future gas man. The same, however, may be said of almost every other branch either of chemical industry or engineering. It is only in the most modern educational institutions that specialization is attempted, and this to only a limited extent. That there is not a course of education relating to gas manufacture must be admitted; but is this really a matter for regret? Is it not likely that the youth who goes straight to a gas-works well grounded with a knowledge of chemistry and physics, will have less to unlearn than one who spends the next two or three years attending lectures upon the science and practice of gas manufacture, given by a professor whose opportunities for keeping himself abreast of modern practice are certain to be limited? Surely experience in these matters is the best teacher. Or, if a college or a university career be open to him, a youth will better fit himself for the problems by which he is hereafter confronted by applying himself to the ordinary curriculum than by giving his time to the special study of gas manufacture. He will have time enough for the latter before he is called upon to occupy any post of responsibility; and his previous training will prove to be an immense advantage. But to the vast majority of our future gas managers, no such career is really open. In an article in the "County and Municipal "Record," a few weeks ago, upon the "Qualifications of a "Gas-Works Manager," it is assumed in fact that the average gas manager has had, to commence with, a "good "Board School education." It is evident that this, good though it be, so far as it goes, is not sufficient preparation for the fulfilment of the various duties which usually fall to the lot of a gas manager, who thus commences his career under disadvantages which it is not given to all to overcome. The making of a successful gas man requires, however, that they be overcome by individual effort and by making the most of opportunities. It is necessary also that the commercial should not be divorced from the technical side of the business, but that one head should be mainly responsible for both. A good engineer may, and generally does, make a good commercial man, but the latter cannot make a good engineer. The subject, however, is a many-sided one; and our columns are open to all who may desire to discuss it.

Gas Displaces Electric Lamps in City Streets.

CIRCUMSTANCES have imposed upon us the by no means unpleasant duty lately of calling frequent attention to the question of public lighting. The gas industry has proved important advantages for what they have to offer for street illumination; and while the public are crying out against the present heavy load of rates in most parts of the country, to which the cost of public lighting by electricity and deficiencies on electricity undertakings have subscribed, the gas industry naturally cannot be blamed for making the most of their exceptionally favourable opportunity for recovering lost business. We have kept our readers informed of the spread of discontent over the increased expense for public lighting since changes have been made from gas to electricity, which addition to the public expenses is altogether superfluous in these days of incandescent gas lighting. This is being recognized everywhere, though in all places the electricians and their supporters are putting forth their utmost energy to conciliate public opinion, by proclaiming that the ratepayers are receiving full value for their money. But opinions formed of a compound of experience of the lighting and a heavy toll on the ratepayers are extremely refractory things; and so the electricians and their adherents are finding them. As a result, there are several local councils who have cried a halt in this form of extravagance, and are looking into the question of retrenchment.

One of the most luminous examples of civic virtue in this regard is to be found in the Corporation of the City of London, who have not only learnt by experience—to quote words employed by Mr. A. C. Morton, the Chairman of the Streets Committee—that "electric lighting is a complete "failure as regards street lighting," and that the annual cost of incandescent gas lighting is only "a little more than "used to be paid for flat-flame lighting," but they are not hesitating to profit by that experience by gradually supplanting the electric arc lights and flat-flame gas-burners by incandescent gas-lights. This is seen by the annual report of Mr. D. J. Ross (which we regret is the last one we shall have from him, in view of his well-earned retirement from the City Engineership), as noticed in our news columns, and by the highly interesting decision come to last Thursday

by the Corporation, to displace 47 electric arc lamps in the City, and to erect in their stead 78 high-pressure gas-lamps in Queen Victoria Street and Lower Thames Street, and 34 ordinary incandescent gas-lamps in Fleet Street. The introduction of electric columns and arcs in place of the original gas columns and lanterns represented a heavy outlay; but, even so, a majority of the City Corporation have now recorded their opinion that it will be an economical proceeding and an excellent investment for the ratepayers to at once substitute the 47 electric arc lamps by 112 incandescent high-pressure and ordinary incandescent gas-lamps at a cost of £1052, and so save, even at the present prices, £363 a year. This saving is equivalent to 18 per cent. on the initial outlay; and, while gaining it, the Corporation Streets Committee and the public will find satisfaction in both reliability and effect from the change. Herein we have the application to the municipal service of a fundamental principle of modern industrial practice—the abandonment of the existing for the new, if the new can produce an economy showing upon the outlay involved a balance of profit. The figures advanced by Mr. Morton indicate that there is a saving in the change; and his experience and that of his colleagues is that there will be no loss of efficiency in the public lighting as the result. Applying, too, the economical effect of the supersession of the 47 arc lamps to the whole of the 500 odd arcs in the City, we should arrive at an ultimate saving of close upon £4000 a year.

We have had to chronicle some notable successes of gas in competition with electricity for public lighting purposes; but this one—coming from the City with its dense traffic and after an experience that cannot both in point of number of electric and gas lamps and duration of trial be characterized as insufficient—we must and do welcome with some amount of exultation. The discussion of the matter last Thursday will be found interesting, in respect of the weakness of the opposition to the change and the strength of the case for it. Not a word was uttered against the asserted saving, not a word against the efficiency, but there was the usual attempt at feeble sarcasm by a member asking why the Streets Committee did not at once recommend the retrograde step of lighting the streets by oil-lamps. When hostility cannot find a case in a contention of merits, then poor must be the foundation for the hostility. The exiguous and impotent character of the opposition also brought into strong relief the personal experience of Mr. Councillor Williams. He stated that "he had been using 100,000 units of elec- "tricity a year; but he was sorry to say—sorry because it "meant a big expense to him—that he was now going back "to gas, which was 50 per cent. cheaper." It is difficult to see why Mr. Williams should be sorry for taking a philosophic course which will remedy a former mistake, and which will save him 50 per cent. per annum upon a considerable expenditure.

There is another aspect of this displanting of electricity by gas that renders it of eminent interest; and it is that Queen Victoria Street and part of Lower Thames Street are to be lighted by the high-pressure incandescent system. The bridges across the river and their approaches are already lighted by this method; and a more critical test of efficiency could not be desired. At the Mansion House, at Ludgate Circus, and other important places, there are also installations; and as the extensions now being carried out will, as it were, link up the high-pressure lighting between two of the bridges—Blackfriars and Southwark—and the Mansion House, it will afford one of the best demonstrations of the system that we have yet had in the streets of the Metropolis. The existing installations at well-known centres should render less difficult future extensions beyond those already passed by last Thursday's vote. However, on the general subject, the action of the City Corporation should have a good influence all through the country. At an inquiry a few weeks ago at Leyton, the Inspector (Mr. Bicknell) stated that the Local Government Board were "under the "impression" that in the case of street lighting, electric lamps were more costly than incandescent gas-lamps. We are of opinion that Mr. Bicknell was putting the matter too mildly; for the Board's actions speak louder than words, and the "impression" is undoubtedly a deeply-rooted conviction. Local authorities will therefore be serving their own communities well by emulating the business-like lead of the City Corporation. Let them not be deceived that this is merely an ordinary experiment. As we have shown, high-pressure lighting has had a severe trial in the City already; and at the end of last year, the conversion of flat-flame gas-lamps to the incandescent system had been carried to a total of 2111. On the present conversion from electricity to gas, close upon £2000 is to be expended. Do these facts spell "experiment"?

Responsibility of Gas Undertakings for the Reinstatement of Roadways.

A CASE of considerable importance with reference to the question of the reinstatement of roadways after main-laying operations was decided at the Thames Police Court last Wednesday. The Commercial Gas Company were summoned by the Poplar Borough Council for the cost of filling in the ground, and making good the pavement surface of parts of certain streets within their area affected by the work of the Company, to the reasonable satisfaction of the Surveyor to the Council, pursuant to the provisions of the Metropolis Management Act, 1855, and the Metropolis Management Amendment Act, 1862. It was explained by Mr. Chester Jones, who represented the Council, that this was a friendly suit, in order to decide the question. By the Metropolis Management Act, the Company are under penalties to reinstate roads. The road in question in this case is paved with concrete, which was removed by the Company, together with a quantity of earth to form a trench. It not being possible for them to put the whole of the earth back again, subsidence, as contended by the Council, was certain to take place. To guard against the consequences of this, the Council decided that, in all such cases, extra concrete must be put in by the Company. It is this additional concrete that the Company refused to pay for, on the ground that it would make the roadway better than they found it; and this was not contemplated by the Act. They were, moreover, required under the Gas-Works Clauses Act, 1847, to make good any subsidence which might occur within twelve months. This, it was maintained, clearly defined their liability, since the possibility of subsidence was anticipated by the Act; and if it ever did occur the Company were bound to make it good. The learned Magistrate, however, came to the conclusion, after hearing the evidence tendered by the Council, that the precaution insisted on by the latter was necessary, in order to prevent any subsidence; and he therefore decided against the Gas Company. But, on the application of the Company's Counsel, Mr. Colam, the Magistrate agreed to state a case.

It will be seen that the case of the Company rested mainly on the provisions of the Gas-Works Clauses Act, 1847, which were framed at a time when macadamized streets or roadways were much more the rule in gas areas than they have since become—trenches dug in such thoroughfares, however carefully they may be filled up, inevitably subside for a considerable time, and hence the provision for their restoration. Nowadays, as gas undertakers know to their great cost, wood or other similar paving has become very general; and the conditions have consequently undergone a change. The subsidence of a trench which has been paved with any material of which concrete forms a part, is a much more serious matter to put right than in the case of any macadamized surface; and it is a question whether, in the interests no less of the gas undertakers than of the road authorities and the public, a little extra expense in filling up is not to be preferred to the risk of having to do the work over again in the event of a subsidence. Prevention in such a case would seem to be better than cure; and an appeal to a Police Magistrate should hardly be necessary for the purpose of deciding what is reasonable as between a Road Authority and a Gas Company with regard to it. At the same time, this incident seems to illustrate the desirability of the Gas-Works Clauses Acts being brought up to date by a further amendment, which might afford an opportunity for the enactment of a uniform method of gas-testing both for illuminating power and purity.

Imperial Continental Gas Association.

THERE is nothing special to comment upon in the past six months' history of the Imperial Continental Gas Association; the fact of the matter being that the whole result of the half-year's working of this huge concern could be summed up in the two words "satisfactory progress." This is one of the few big gas supply businesses in which the Chairman

speaks in thousands of millions of cubic feet of gas with the ease that some chairmen of provincial undertakings proudly speak of millions reaching only to two figures. On this occasion it was Mr. J. Horsley Palmer's pleasure to have to report that the quantity of gas made in the half year reached a total of 4829 million cubic feet, which is an increase of 276 millions, or at the rate of 6·06 per cent. Excepting in the case of rapidly developing suburban districts, this percentage stands in excellent comparison with the general experience of the latter half of 1904 in this country. But the number of consumers is increasing at a greater rate than the consumption—the addition for the half year being 31,907, or 11·84 per cent.; and this indicates the success on the Continent of the opening up of business relations with consumers whose requirements are of a smaller order than those of the classes upon whom the Association formerly relied. However, both in respect of consumption and the number of consumers on the books, the Association have never presented such high records as they do to-day. This is somewhat surprising, when it is remembered that Amsterdam, Vienna, and Haarlem were all making substantial contribution to the business in 1898, but have since been detached from the Association, and gone under municpal management. It is a matter worth passing note that in that year (1898) the quantity of gas sold, including the business of the three cities named, was 7900 million cubic feet, while last year the amount was 8200 million feet. Although the business is now larger, the capital employed directly in it is, we believe, considerably less than it was in 1898. We need not point out to our readers what this means, as its tale of progressive economy in operation is plain, notwithstanding the large amount of capital spent, since the days of Amsterdam, Vienna, and Haarlem, in modern works and plant of a comparatively expensive but economizing character. However, the Chairman's address will be found to contain much of interest. It will be remarked that the average cost price of coal was less in the half year by 2½d. per ton; but the heavier contracts for the present year which circumstances forced the Directors to enter into rather earlier than usual, and at the time of the difficulties in the Westphalian coal-field, have been arranged at 2d. per ton more than last year. On the other hand, in the past year and in the present, the industrial prosperity of Germany is reflecting itself in the good state of the coke market. The participation of labour in the ruling prosperity has caused some enhancement of the wages of stokers and yardmen; and other classes of men at the Association Berlin stations are likely to become beneficiaries through the action of the Municipality in deciding to raise the wages of the men similarly occupied at their own works. The information imparted by Mr. Horsley Palmer as to what the Association are doing at their meter-factory, and as to their system of providing for distress through ill-health and the future of their officers and men and widows and families, will be found of uncommon interest. What we specially miss on this occasion is a report of the progress of the vertical retort trial at Mariendorf.

Interference by Tramways with Gas Distribution Systems.

Modern progress in certain of the refinements and conveniences of civilized life appear to—and do actually—impose on suppliers of gas many hardships and burdens which do not add to the comforts of official existence. In connection with their distribution systems, difficulties supervene with every new adoption of services which are of more or less utility to the public. All this calls for increasing protective forethought, and subsequent watchfulness and care on the part of gas engineers. Electricity distribution and the resulting vagrant currents cause considerable trouble, and the great and general success of electric traction for tramway purposes has also brought in its train new difficulties, first with respect to the disturbance occasioned to the gas distribution system, and, secondly, owing to the nature of the construction of the tramway tracks, in respect of the execution of work that the growing gas requirements of the community may render necessary. Gas companies can do much, but they cannot accomplish physical impossibilities. In applying for electric tramway powers, however, municipalities struggle hard to bind gas suppliers to the condition of things which formerly existed under easier circumstances, and which is altogether nullified by the new methods of traction and construction. The protection afforded by the old Tramways Act under conditions occasioning comparatively little disturbance of the roadway, and which did not greatly affect after-access to the gas distribution systems, is, of course, altogether inadequate under the modern methods of providing public convenience in this direction. It is not contended that anything in the nature of a public service that exists to-day should be allowed to interpose avoidable obstacle to progress in another direction which will be to the public advantage. But this we do say, that, in the case of such an important service as gas supply, the promoters of new schemes of any kind should deal generously with the older occupant of the road, and should regard the full expense and damage to a gas or water distribution system accruing from the improvement as incidental to the carrying of it out, and therefore fairly attaching to it. That is what gas companies ask the promoters of these electrical tramways to recognize, and what they have a perfect right to expect that they will recognize. In another column, we are able, by the kindness of Mr. Thornton Andrews, to give an outline of experiences at Swansea in connection with this matter. The Gas Company, of which he is the distinguished chief official, are very active in the defence of their rights as public servants and as ratepayers; and when the Corporation in 1902 applied to Parliament for considerable tramway powers, the Company secured a comprehensive set of protective clauses which have already been of substantial benefit to them—putting it in hard cash, to the extent of £1500, in addition to consideration, consultation, and agreement before and during the progress of the work. The story of the Swansea experience shows that the securing of protection is only one part over which the utmost watchfulness must be exercised; carefulness and exactitude must also dominate the subsequent action of the Company owning the distribution system. Only by such means, it will be seen, was mutual protection obtained step by step in the Swansea case, and the cost and vexation of arbitration averted. We congratulate the Company and Mr. Thornton Andrews upon the result. The settlement at £1500 for the work necessitated to the gas distribution system by the tramway construction was within £272 of the total of their claim, and that is testimony to the Company's fairness in the matter.

Prosperity at Southampton.

Prosperity is not a new description to apply to the condition of gas companies; in fact, it is so uniformly the state of affairs as to almost pass unnoticed—that is to say, by all except the shareholders of the particular undertaking referred to. But by the fortunate proprietors, if by no one else, the statement made by the Chairman of the Southampton Gas Company (Captain A. J. Corse Scott, J.P.) at the half-yearly meeting last week will be eagerly studied; and this with a very considerable amount of pleasure. There were increases all round to be reported, with the important exception of the price of gas, which, as from the beginning of this year, has been reduced in the added areas, so as to make an equal charge over the whole of the Company's district. No doubt this will have some effect on the accounts for the current half year. But the wisdom of the step cannot be questioned; and the Board are to be congratulated on being in a position to take it so long before the Act obliges them to do so—the stipulated period being within ten years from 1898. This is, however, not the only matter that may temporarily exercise an adverse influence over the revenue account; for it is disappointing to learn that the threat of the Guardians to increase the assessment of the undertaking to a so far unnamed extent is still hanging over the Company. Six months ago the Chairman expressed the hope that an amicable agreement on this matter might be arrived at; and on the present occasion he re-echoes this sentiment—pointing out that already the consumers have to bear a burden of 1⅛d. per 1000 cubic feet to meet the demand for local rates. The gas consumers should see to it that, in addition to this already heavy impost, they are not called upon—as, either in the capacity of ratepayers or of gas consumers, they would be, whichever way the case went, in the event of an appeal—to pay the cost of expensive litigation owing to the refusal of the Guardians to meet the Company in a reasonable spirit. At the meeting last week, one of the Directors took the opportunity to point out to the shareholders that the accounts on the next occasion might not be so rosy as those for the past few half years; but so far as this may be caused by the reduction in

price, it is safe to say that the falling off will be experienced only for a very short period. Meanwhile, the position of the business is such that the proprietors can well afford to regard with perfect equanimity any fluctuation likely to occur.

Halifax and its Tar-Works.

A great part of a meeting of the Halifax Town Council extending over more than four-and-a-half hours last week, was taken up in considering a drastic resolution moved by the Chairman of the Gas Committee with reference to the tar distillation works of the Corporation. Put shortly, the object of the motion was to shut down the works, on which over £20,000 of capital has been spent, because of the loss incurred through operating them. This was a serious proposition; and so the members regarded it, for they decided not to come to a hasty conclusion on the matter. So that due consideration may be given to the subject in all its bearings, it was in the end unanimously resolved that a Special Committee, consisting of six members of the Council and six members of the Tar-Works Sub-Committee, should consider the best way of dealing with the plant. On their report, the fate of this department of the Halifax gas undertaking will depend. Meanwhile, it is interesting to note that opinions on the question of the advisability of ceasing operations are much divided. While the majority of the members of the Gas Committee do not appear prepared to face the possibility of further loss by continuing working, the conviction was expressed by certain of the councillors that the position was by no means so bad as to render hopeless any attempt to secure better results in the future than have been obtained in the past. The works have not yet been in operation for two years; and one of the main arguments of the opposers of the resolution was that this was not a long enough period to show what the department was capable of doing under proper management—which, it was contended, it had not had the advantage of in the past. As is generally the case when the affairs of an unsuccessful business undertaking are under discussion, a lot of time was taken up in an endeavour to fix on somebody or other the responsibility for the unsatisfactory state of things. Rightly or wrongly, the late Tar-Works Manager came in for a lot of attention in this respect; but he was by no means alone. Some members sought to lay blame on the Gas Committee, and others on the Tar-Works Sub-Committee; the capitalization of the works and the type of still adopted receiving their share of criticism. These things, however, are more or less of the past; what the Special Committee have to take into account is the future. The question, it seems, that they have to decide is whether, things being as they are, it will pay the Corporation to take over the tar for distilling purposes from the gas-works at exactly the same price that the Gas Committee could secure for it if disposed of to outsiders.

Coal Contracts at Stockport.

While Halifax has been thus agitated over the disposal of its tar, the Stockport Town Council have succeeded in engendering what appears to be an altogether unnecessary amount of excitement over the question of whether the gas coal contracts should be let for a period of one or two years. The Gas Committee agreed, on the casting vote of the Chairman, that contracts for two years should be entered into; but this proposal found very slight support in the Council, an amendment in favour of one year being carried by a very large majority. Whether or not this decision will prove to be an economical one for the undertaking, time alone can show; but whatever may be the result, the reason given by the member who moved the amendment—that he did so on the broad principle that the two-year proposal was a pure speculation, and they ought not to indulge in speculation on behalf of the ratepayers—does not strike us as being a very sound one. All contracts for the sale or purchase of commodities over a given period must contain in them an element of speculation. If the sellers knew the price of their goods was going up, they would not be likely to enter into an agreement by which they would lose the advantage of the rise; and the same would hold good with the buyer, if he were certain that the price was going to fall. The difference in this element of chance over one year or two years can be only one of degree; and it is difficult to understand how one period can be looked upon as a "pure speculation," and the other not. One may be more of a speculation than the other, but that is all; the principle involved is the same in both cases. In this particular instance, the Chairman of the Gas Committee gave good reasons for his opinion that it would be to their advantage to let the contracts for two years, as had been done on some previous occasions; but, of course, it could only be a matter of opinion, and he did not pretend that it was anything else. Perhaps, however, it was quite as well that the Council should have threshed the matter out, in view of the difference of opinion which existed on the Committee. While the Chairman was thus strongly in favour of the longer period, the Vice-Chairman seconded the amendment in favour of one year, on the ground that it was not advisable for one Committee to bind a Committee that would be elected another year. If there is anything at all in this argument, it seems to point to one of the disadvantages of the administration of these trading undertakings being in the hands of frequently-elected Committees, rather than to strengthen the case on behalf of the one-year contract. It is only right to point out that some of the members, in supporting the amendment, were apparently influenced by the feeling that, as the tenders were originally sent in for one year (in accordance with the general custom of the Corporation), it would be hardly fair to make any change now, as only a few firms out of the large number who in the first place sent in tenders had been subsequently invited to quite for two years. This attitude is at least perfectly understandable; but so far as the objection to "indulge in speculation on behalf of the ratepayers" is concerned, the thought that occurs to one is that, if this is a sound position to take up, and it is carried to its logical conclusion, municipalities should not embark upon trading enterprises, which must perforce be subject to such risks as are of the very essence of all business transactions.

In the Cause of Household Good.

There is a peculiar interest attaching to the report which appears in another column of the opening last Tuesday of four exhibitions having for their object the improvement of the culinary art. At the Horticultural Hall, Westminster, His Royal Highness the Duke of Connaught honoured the Universal Cookery and Food Association by inaugurating their sixteenth exhibition, one of the principal purposes of which, as explained by the President (Mr. W. Burdett-Coutts, M.P.), is to teach the poorer classes how to make the most, as well as the best, of what they have. The Association recognize the value of the gas-stove as an auxiliary; and consequently gas was used throughout in the demonstrations and competitions which were the principal features of the exhibition. The Association received material assistance from the Gaslight and Coke Company, whose Chief Inspector (Mr. F. W. Goodenough) had three model kitchens fitted up to meet different requirements—one being suitable for an artisan's dwelling. The extent to which the Company's efforts to supply the wants of the poorer classes have been appreciated is shown by the fact that 200,000 penny-in-the-slot meters have been fixed in their district, and that 75 per cent. of them have a cooking-stove attached. The enormous advantage of a gas-stove in the preparation of the early meal taken by a workman before starting on his labours, especially in the cold and dark weather, does not need emphasizing. The other exhibitions, which are being held at Hornsey, Crouch End, and Muswell Hill, are the outcome of an attempt, which was found successful last year, on the part of the principal ironmongers in the district, working in conjunction with the Hornsey Gas Company, to bring more closely under the notice of residents the stoves of the best makers, and demonstrate their value for culinary purposes with the assistance of skilled ladies. With the view of attracting visitors, afternoon tea is provided free of charge; so that in the course of a walk ladies may obtain refreshment for the body and instruction for the mind. At Yeovil, as will be seen from the article appearing elsewhere, there have lately been some highly successful cookery competitions for girls. These efforts are very laudable. There is much clamour for the "higher education" of women; and we fear it is greatly needed—not in the dead languages or in mathematics, but in domestic management. We yield to none in admiration (at a respectful distance) of the gifted lady who can discourse as learnedly as her husband on pathogenic bacteria, or of that other who, when the results of her husband's elaborate investigations were destroyed by fire, showed herself to be quite capable of repeating the experiments and of reproducing the results. These ladies are

endowed with exceptional qualities, which a fortuitous concatenation of circumstances has enabled them to exercise—possibly to the benefit of the world at large. But our admiration is very much greater for the frugal housewife who gets the utmost value for every shilling with which she is entrusted, and deals with her purchases in the most economical way. Domestic management is the true province of the woman. "Nothing lovelier can be found in woman than to study household good." So sang the Puritan poet, whose own domestic life was not so happy as it might have been if the force of these words had been fully recognized. However, there can be no question that "household good" is largely promoted by proper cooking, which, in its turn, is greatly facilitated by the use of gas-stoves. It was with the view of making this fact more generally known that the exhibitions and competitions we have been noticing were organized. They fully deserve success.

Scottish Trade Unionists in Congress.

Another Trade Union Congress has come and gone; and resolutions much on the usual lines have been passed. But to what end? This time it is the Scottish Unionists who have, at Hawick, been devoting themselves to labour questions. But even the Chairman (Mr. R. Smillie) seemed a little bit doubtful as to the usefulness of it all; for he remarked that "it was a bit sickening year after year that they had to meet and pass resolutions and find that so little real progress had been made." His remedy for this, from his point of view, lamentable state of affairs is to secure direct Trade Union representation in the House of Commons and on all public bodies. This would no doubt be effective if the candidates were returned in sufficiently large numbers; but that seems an unlikely contingency, at any rate for the present, though Mr. Smillie is hopeful of seeing forty or fifty members of the Independent Labour Party returned at the next General Election. The Parliamentary Committee, in their report, declared that no amendment of the Workmen's Compensation Act would be considered satisfactory which did not provide (1) that all workers on land and sea presently excluded from its operations be included, (2) that payment begin from the date of the accident, (3) that the weekly payments be not less than 75 per cent. (with a minimum of 15s. per week) of the full weekly wages that would have been earned by the injured persons had they been fully employed, (4) that the workers equally with the employers have the right to apply for commutation for a lump sum, and (5) that the clauses relating to wilful and serious misconduct be abolished. These stipulations and the remarks made when the report was discussed would appear to indicate that, even if the Government Bill, the provisions of which have been set forth in the "JOURNAL," becomes an Act, we shall immediately be faced with a fresh agitation for still further amendment of the law relating to compensation. The Congress spent the greater part of four days in passing resolutions; and if the forty or fifty Labour members who are expected to be returned to the next Parliament devote their energies to bringing even a part of the questions therein referred to before the House, it is to be feared that there will be small time left in which to attend to any other legislation than that which the Scottish Trade Unionists conceive to be in the interests of the working man. If they are to satisfy their constituents, these members of the Independent Labour Party, when elected, will have to keep themselves fairly busy.

Deposits for Tender Forms.—After considering the desirability or otherwise of receiving deposits upon applications for contract tender forms, the Finance Committee of the Holborn Borough Council have come to the conclusion that the deposits are too small to be any guarantee as to the solvency of the firms tendering; and having also regard to the recent remarks of Mr. Justice Jelf at the Central Criminal Court, they recommend that the system be henceforward abolished.

Bruce Peebles and Co., Limited.—It will be seen from an announcement which appears elsewhere that this well-known Edinburgh company are about to issue at par the balance of their preference and ordinary capital, consisting of 10,000 cumulative preference 6 per cent. shares of £5 each, and a like number of ordinary shares of similar nominal value. The Company was formed in 1903 to acquire and carry on the business of Messrs. D. Bruce Peebles and Co. (established in 1866), and dividends of 6 per cent. have since been paid on both classes of shares, a sum of £6000 has been written off preliminary expenses, and reserve funds to the amount of £12,000 have been created. The balance of profits carried forward at the close of last year was £3854.

THE GAS STOCK AND SHARE MARKET.

A General Depression of Prices.

THE Stock Exchange re-opened on Tuesday, after the usual May-Day holiday. At first there were some signs of an improvement upon the unsteady tone which had marked the previous week, and prices began to come in a little better. But it could not stay, and soon all the old factors which had produced a feeling of nervousness and uncertainty were at work again. Added to them was the extremely weak condition of the important American market. So that, altogether, it was not a happy week, and all prices moved down accordingly. Consols on Friday and Saturday changed hands several times as low as 89¾—a price which had not been touched for some time past. In the Money Market, there was a good, strong demand, and the improved rates were well maintained; while discount quotations were harder. Business in the Gas Market showed a very fair advance upon the state of things ruling the previous week. Prices generally were good, although few quotations have moved. A remarkable exception to this was a smart rise in Gaslight ordinary, influenced, perhaps, to some extent by the proceedings in the Court of Common Council on Thursday (a full report of which will be found in another column) in regard to superseding electricity in certain main thoroughfares of the City by incandescent gaslights. The quotation of Gaslight ordinary rose a couple of points; the figures at which transactions were marked rising steadily from 96 to 98½. The secured issues were fairly active. The maximum marked 92¾ and 93, the preference from 109 to 109¾, and the debenture 90½ and 91. South Metropolitan was only moderately active, and prices were steady, ranging from 127¼ to 128½. The debenture was done at from 89 to 90¼. Commercial was very quiet; a single bargain in the 4 per cent. at 115 and one in the debenture at 87 being all the business done. The Suburban and Provincial group were almost entirely neglected. A small parcel of Brentford old was done "free" at 248; a couple of bargains were marked in West Ham preference at 125; and that was all. On the local Exchange, Newcastle had a further rise, which brings this popular stock up to the price of about 4⅛ per cent. for money; the highest price in the market. The Continental Companies continued still inactive. Imperial was stronger, at an advance of a point, and business was marked at from 219 to 220½. Continental Union was done twice at 112, but European was not dealt in. Malta was done at 4⅛. Among the undertakings of the remoter world, Bombay fully-paid marked 7, and ditto part-paid 5⅜. Hongkong had a busy day on Thursday at 16½ and 17. Melbourne 4½ per cent. bonds marked 102 and 102¾; but the 5 per cents were not touched. In Primitivas, the ordinary changed hands at from 6 to 6 3/16, and ditto preference at 5¼ at 5 3/16. River Plate ordinary marked 12 and 12 1/16, and ditto debenture 98. San Paulo was done at prices ranging from 12⅝ to 12¾.

ELECTRIC LIGHTING MEMORANDA.

Borrowed and Subscribed Capital and "Profits"—Proposals for the Sale of Municipal Undertakings—Municipal Trading in Electrical Fittings—Sudbury's Costly and Abortive Flights after Electricity.

THERE is an extraordinary reserve on the part of some municipal councillors in distinguishing the differences between a private commercial business and one municipally conducted. In the former case, the business is carried on by money privately subscribed or privately borrowed; but however the capital is obtained, those running the business alone stand the financial risks or enjoy the gains. If the money is borrowed by the private individuals constituting the company or firm, they are responsible for meeting, from the proceeds of the trading, the repayment of the capital and the interest. The nearest resemblance to a municipal trading department is provided by the private business carried on with borrowed money. But the comparison is insufficient—seeing that, in the case of the privately owned business with borrowed money, the business has to find the money for capital charges, or certain legal processes are quickly introduced; while, in the case of the municipally owned undertaking, if the business is not a success, then there are the ratepayers to fall back upon, and never a fear of any legal machine being set into motion to ruffle the serenity of those in charge of the undertaking. Mr. H. V. Scott is the Chairman of the Electric Lighting Committee of the York City Council; and he is one of those who compare a municipal electricity undertaking with a private venture run by shareholders, and not with one carried on by means of loans. Laughter greeted his statement, in presenting the annual electricity accounts at the meeting of the Council yesterday week, when he said that, though they presented a deficit, there was, as a matter of fact, no loss whatever, but a considerable working profit. Let us see how far this holds good. The revenue for the year amounted to £10,732; the cost of production was £5918; and the gross profit, in round figures, £5000. This, Mr. Scott remarked, would have been, in an ordinary trading concern, divisible among the shareholders; but the Committee had had to meet the repayment of a proportion of the capital and interest. In consequence, the net

deficit is £2946. Of this £924, which has been expended on new offices for the department, is to be met out of the rates; and the balance is to be carried to a suspense account. There are no shareholders in such a concern—shareholders who have subscribed from their individual banking accounts the capital required, and who expect nothing more than a fair dividend on their venture. If they had borrowed the money, they would expect to pay it all back, with interest, out of the returns on the business before they themselves came into the enjoyment of profit. So with municipal trading departments; the business being conducted by loan capital only—there can be nothing, until capital obligations are met, that can be looked upon in the light of profits. "A fairy tale from the East" was Alderman Sir J. S. Rymer's description of the little piece of commonly employed fiction trotted out by Mr. Scott, and which afforded his colleagues so much delectation on the occasion referred to.

There are many electric lighting undertakings that appear to be inextricably mixed up with bad fortune; and those who are immediately responsible for them to the Councils and the ratepayers must often feel quite sick at heart waiting for the change in circumstances that refuses to come. Many of these local authorities, we fancy, would gladly (if it were possible) retrace their steps, and reoccupy the position that they were in before they confidently spent the thousands of pounds borrowed in the name of the ratepayers on electricity generating and distributing plant. There are now members of local authorities who are harbouring some idea of finding purchasers for their works. A member of the Southwark Borough Council has given notice of a resolution agreeing to the sale of the undertaking "as a going concern, in view of its heavy cost to the ratepayers." Then we have the Worcester City Council again contemplating a loss on their undertaking this year; and the Chairman of the Finance Committee (Alderman Millington) has seriously counselled the Corporation to put an end to the continual loss by disposing of the unfortunate concern. He is of opinion that a buyer could be found. The works have been in operation now ten years; and in that period, there have been amounts appropriated as profits. But these appropriations set against the losses leave a balance of £4286 on the wrong side for the ratepayers. This means that, averaging the loss, there has been a deficit of £428 each year since the works started. The suggestion, of course, has been met by a division of opinion. It is thought by one member that the Council should seriously consider the proposal, in view of the amount of capital it would set at liberty for other purposes; while other members are doubtful, and would—naturally—prefer to know what the city would be likely to get for the undertaking before letting it pass into other hands. As heavy contributors to the rates, Gas Companies would, of course, very much like to see such undertakings as those at Southwark and Worcester change ownership, and the quicker, the better.

The electrical contractors throughout the country are making themselves felt in their campaign against municipalities entering into competition with them in the supply of electricity fittings. There is a marked distinction between the electrical contractors of to-day and the ironmongers of old. The former appear to be keenly alive to the necessities of the times, and are prepared to enter into all sorts of up-to-date electrical business; while, on the advent of gas-cooking stoves and fires, and the supersession of the flat-flame burner by the incandescent burner and mantle, the ironmongers missed their opportunity by ignoring the business that lay before them, and compelling gas companies and municipalities to take it up in order that their undertakings should not suffer. Municipal trading in any shape is objectionable; but we cannot blame municipal gas committees of the past for meeting a demand, and what was an absolute necessity, both in the interests of their undertakings and consumers. The ironmongers would be glad enough to recapture what they have lost through their apathy. There is no doubt that it may be claimed that the experience of the ironmongers of the results of their indifference in connection with gas has spurred the electrical contractors to greater enterprise in the matter of catering for the wants of those who have a preference for electric lighting. Had similar energy been seen in the past in connection with the supply of gas appliances and fittings, there would have been greater sympathy with the tradesmen than there has been from municipal gas departments. One-time indifference on their part is being met by indifference to their clamouring in the present. But suppliers of electrical fittings are in different case. They are showing a live interest in requirements; and from the point of view of the ratepayer, the wiring and fitting business being of a more risky character than in connection with gas supply, it may well be left to the enterprise of the private contractor. The Chester Corporation have had a discussion on the subject. The Electricity Department of the city are making frantic efforts to improve the fortunes of the undertaking; and they are going to try to gain more business by reducing the price of electricity to 4d. per unit, by selling to consumers and contractors incandescent and Nernst lamps, and by advertising and taking other steps to popularize electricity. But, in addition, they were proposing to open a show-room, in which the electrical contractors and several members of the Corporation perceived a "shop," and a dead-set was made against it in the Council. The recommendation has been referred back to the Committee; but the Council are inconsistent in passing the recommendation permitting the Committee to provide and sell incandescent and Nernst lamps. Whether they will hereafter be allowed the show-room or "shop" is still open for determination; but, in view of the vote in the Council, the chances are against them.

The town of Sudbury (Suffolk) has its local intelligence served up through a paper known as the "Essex and Suffolk News;" but we should not imagine this little journalistic enterprise—old-standing as it is—has much influence in directing the course of public opinion in the town. We hope it has not when matters of which the Editor has little or no knowledge are under discussion. Electric lighting is apparently one of them; and it may be suggested to the Editor that he should prime himself on the true experiences in electricity speculation and public lighting by that system in towns of even somewhat larger population than Sudbury before he further devotes his pen and his space in the "News" to the support of any visionary scheme in this direction. In the "Local and District Jottings," in a recent issue of the paper, we find the Editor has quoted from our comments of a fortnight ago on the subject of the expensive and wretched muddle that the Corporation have worked themselves into over the electric light business; but, as he only introduces or dismisses the quotations with a few quite commonplace remarks, it is pretty evident that he is afraid of getting out of his depth by attempting to discuss them. This is a form of journalism which may be placed on the same level as the simple, child-like faith or foolishness of the Corporation in dealing with the electric lighting question. The Corporation, it will be remembered, have an Electric Lighting Order; but not succeeding in obtaining a loan from the Local Government Board for their scheme, they negotiated for what was practically a transfer of their parliamentary powers to a Company. Not obtaining the consent of the Board of Trade to this proposal, the Corporation appear next to have considered—to take the most generous view of the matter—that the consent was unnecessary; and further concluded that, as the Company wisely refused to proceed with the agreement, they could recover from them a sum of £2000, which was to be the forfeit in case of default. It would be interesting to learn who first advised the Corporation that the consent of the Board of Trade was necessary, and then who it was who counselled them that it was not necessary—for that is what the misinterpretation of the Board of Trade reply to the Corporation amounts to. If the latter advice was correct, then that tendered to them in the first instance was incorrect; or *vice versâ*. Mr. Justice Warrington has pronounced in favour of the original advice.

We should have been better pleased with our contemporary if, instead of picking pieces out of our notice of the affair, the whole of the comment had been given, or left entirely unnoticed. The Editor of the "News" accuses us in one place of "gaseous assumptions"—that being the summit of criticism to which he finds it possible to rise. Let us assure him that there was no assumption whatever on the points to which he refers; and if he had taken the trouble to study fully the proceedings in Mr. Justice Warrington's Court, he would have seen that there was nothing of a gratuitous nature about what we had to say. It is also said that—

> The Local Government Board has no "opinion" as to whether an undertaking is likely to pay or not; and the loan was not refused on that ground. The town had exceeded its borrowing powers. The Local Government Board is prepared to sanction vast loans for sewerage works—unproductive undertakings, which may be purely experimental, and even condemned by experts.

This in part is not only "gaseous assumption," but it is altogether illogical. "The Local Government Board has no 'opinion' as to whether an undertaking is likely to pay or not!" We can point to several cases where the Board have held that opinion. "The loan was not refused on that ground; the town had exceeded its borrowing powers." This shows that the Corporation are guilty of mismanagement of the town's affairs, and are unworthy of the confidence of the ratepayers and of the Local Government Board. But though the town had exceeded its borrowing powers, if the Board had been persuaded by the case of the Corporation that there was profit to be made out of the supply of electricity in Sudbury, is it likely they would have declined the loan for such a productive undertaking? A long experience of Local Government Board inquiries and their results does not suggest to us a precedent where the Board have taken up such a position. The Editor of the "News" drops into further absurdity when he tries to establish some analogy between sewerage works and electric lighting works. Of course, there is an analogy in that they are both in many cases "unproductive." But the reason why the Board are prepared to grant large loans for sewerage works, though "unproductive," is that, for the well-being of the community, they are necessary; while the trading in electricity by a municipal body is not a necessity, but, where unproductive (as is so often the case), is a burden on the ratepayers, as is everywhere public lighting by electricity. Further fallacious reasoning is found when the Editor argues that the expenditure on the scheme "after all would only affect the larger ratepayers, who use large quantities of gas; the rates of the poorer people being paid by the landlords." The larger ratepayers we fancy would not approve of this inequality; and as the "largest ratepayers" include the owners of cottage property occupied by the poorer class, any appreciable increase of the rates would mean the clapping on to the rents of a further sum. That is what happens elsewhere. Sudbury, if it still hankers after electric lighting, had better get

a champion who is a bit more logical and rather more sure of his facts than the writer of "Jottings" in the local "News." It is a pity that so many country newspapers are prepared to support any hare-brained scheme that drops from the local council, if backed by a majority of the members. Perhaps self-preservation rather than intelligence dictates the attitude.

THE LABOUR PARTY IN AUSTRALIA.

THE many well-wishers to Australia have viewed with growing concern the baneful influence which has been exercised by the Labour Party upon Federal Legislation. Not contented with a "white" Australia, which means prohibition of the employment of any coloured subject of His Majesty, and outrages the sentiment of a United Empire, the policy of the Labour Party seems to be to discourage immigration, and to shut out all who would bring labour or skill to a country which is capable of sustaining a much greater population than the present. So jealously is this pursued, that much scandal was recently caused by a refusal to permit of the landing of a shipwrecked crew. Manifold difficulties have, in fact, been placed in the way of immigration during recent years; and it is not therefore to be wondered at that, while other Colonies—Canada, for example—have exhibited a very rapid growth, Australia has shown but little progress, either in wealth or in population. Whatever may be the hitherto undiscovered merits of Colonial preference, it is not possible for it to form a bond of union between Australia and the Mother Country so long as the former continues to pursue a policy which is completely at variance with the best traditions of the British Empire.

Having succeeded in keeping intruders out of their domain, the Australian Labour Party have been imposing upon employers restrictions of the most irksome kind; among them being the principle of a minimum wage. How rigidly this is adhered to, notwithstanding its disastrous effects, is vividly illustrated by an instance which was recently supplied by a correspondent. Last September, a deputation representing the unemployed waited upon the Premier at Sydney. A member of the deputation, who was also a member of the United Labourers' Protection Society, denounced the principle of a minimum wage, as being, in his opinion, largely accountable for the number of the unemployed. For this frank expression of opinion, he was expelled from his Union. This is how liberty is interpreted in Australia under the beneficent rule of the Labour Party; and together with other instances of a similar kind, it points to a dictatorial design, the economical effects of which cannot but be disastrous. Complaints are occasionally made in this country of the tyranny exercised by Trade Unions; but it may be doubted whether any such flagrant instance as the one which has been quoted can be laid to their charge—at any rate during recent years. Australian democracy has, in fact, imitated the spirit, if not the letter, of some of the worst rules of mediæval close corporations, and, notwithstanding assurances to the contrary, it becomes evident that the tyranny exercised through labour legislation is not only irksome to the community, but in some directions well-nigh intolerable.

An indication of this is afforded by the resolution come to at the recent conference of Australian employers not to register under the Commonwealth Arbitration Act, under the provisions of which every petty dispute between employers and employed must be submitted to arbitration. This, it is contended, is not only a derogation of the common law, but also a violation of State rights. A further resolution passed by the employers affirms the expediency of maintaining the principle of freedom of contract, and of an organization to combat the Socialistic tendency of State and Federal legislation. Whether the law as it stands is constitutional or not, it will be for the Courts to determine; but of the irksomeness of the regulations which it has been the means of imposing upon trade, there can be no question. For instance, a carrier has to handle goods under a variety of circumstances and conditions which cannot be foreseen. Yet, so far from not being tied down by hard-and-fast rules, this industry is subjected to vexatious restrictions. It is said that the award of the Arbitration Court in a recent dispute between the trollymen and draymen consists of 30 clauses dealing with the most minute particulars. Then there has been a milk-carter's award, against which, however, cows and infants are said to have conspired; while, according to "The Times," even a washerwoman may not wash as she pleases, and she who may mangle may not iron.

These are among the conditions imposed by labour legislation, and they tend to hamper industry while they do not protect it. For legislation, while it may easily hinder employment, can do nothing, on such lines, to promote it, It is an artificial system which cannot stand the stress of bad times. For example, when trade is brisk, all is well, and the minimum wage is paid readily enough. As soon, however, as trade begins to fall off, the employer, as is only natural, picks his men, and the older and less efficient have to go. Then is heard the cry of the unemployed, who are prohibited by their Unions from taking work at less than the regulation wage. Freedom of contract, on the other hand, must be mutually advantageous. It should place the employer in a better position to meet competition, and thus provide employment which must otherwise be lacking.

Employers in this country cannot view with indifference the course pursued by the Labour Party in a country where it has the upper hand. They may learn from this something of what is to be expected if the Labour Party in England should ever gain a predominating influence. We do not say that the present leaders of the party in this country are at all likely to imitate the extravagances of their Australian brethren; but their places may at any time be taken by others of a less reasonable frame of mind. Moreover, there is a democratic spirit abroad in the land. Among the unlooked-for results of Mr. Chamberlain's impulsive agitation has been the knitting together of the party of opposition more firmly than has been the case for many years; and the working man is at length realizing his power at the polls. To all appearances, the Labour Party will be much stronger than ever in the next Parliament; and it may, equally with the Irish Party, control the fate of critical divisions.

GAS DISTRIBUTION SYSTEMS.

The Liability of Corporations and Tramway Companies.

AN important matter affecting Gas Companies, as well as Corporations and Tramway Companies, has just been amicably settled between the Swansea Gas Company and the Corporation; and we think that a short statement of the chief points (which we are enabled to give through the courtesy of Mr. Thornton Andrews) will be of value to our readers.

In 1902, the Swansea Corporation obtained powers for the construction of certain tramways under the Swansea and District Light Railways Order of that year, by which Order authority was given them to construct from 8 to 9 miles of tramways in the borough, in conjunction with the existing tramways, belonging to the British Electric Traction Company. When the Order was promoted, the Gas Company, acting under the advice of their Parliamentary Agents, obtained clauses for the protection of their mains, together with power for the alteration or laying of new pipes at the expense of the Corporation in streets through which the tramways were to be constructed, and which tramways would either endanger, interfere with, or otherwise affect the present mains and impede the supply of gas to the consumers.

The Order contained some very important provisions, which enabled the Company, in the course of the construction of the lines, to relay and otherwise alter a great portion of the existing mains. The provisions referred to are found in section 39, sub-sections 1 to 8; the following being an outline:—

(1) The Corporation shall give seven days' notice to the Company of their intention to lay down or alter the railway, and shall at the same time deliver plans and sections of the work. If it should appear to the owners of pipes that the laying down or alteration of the railway as proposed would endanger any such mains or apparatus, or interfere with, or impede, the supply of gas, the owners may give notice to the Corporation to lower or otherwise alter the position of the said mains or apparatus in such manner as may be considered necessary; all alterations to be made under this section shall be made with as little detriment or inconvenience to the owners, or to the inhabitants of the district, as the circumstances will admit, and under the superintendence of the owners if they think fit to attend, after receiving not less than forty-eight hours' notice for that purpose, which notice the Corporation are hereby required to give.

(2) The Corporation shall not remove or displace any mains or apparatus belonging to the Company, or do anything to impede the passage of gas through such mains or apparatus, without the consent of the owners; and before doing so, the Corporation shall lay down, at their own expense, good and sufficient mains in lieu thereof, and ready for use to the satisfaction of the Company.

(3) The Corporation shall not lay down any such pipes at a less depth than 2 ft. 6 in. below the ground.

(4) The Corporation shall make good all damage done to the property of the Company, and shall make full compensation to all parties for any loss or damage which they may sustain by reason of any interference with such property, or with the private service-pipes supplied by the Company.

(5) The Corporation are liable to a penalty not exceeding £20 for every day upon which any interruption to the supply through any mains should take place.

(6) The Company may, upon giving seven days' previous notice to the Corporation, execute and complete any alterations to mains which may be necessary.

(7) Any difference arising under this section between the Corporation and the Company shall be referred to arbitration.

The work of laying down the tramways was commenced by the Corporation about the 1st of March, 1904; and the Gas Company, not having received any notice of such work being about to be commenced, called the attention of the Town Clerk to the fact that the railways had been started, and required notice and plans to be delivered in respect of the intended districts through which the tramways were to be constructed—such notice being required in and under the terms of section 39 of the 1902 Order.

Plans of the districts in which tramways were about to be constructed were eventually received from the Corporation; and the work having been commenced, the Company's Engineer was invited by the Streets Committee of the Corporation to attend a meeting of the Committee for the purpose of advising as to what steps should be taken with respect to the mains and service-pipes which would likely be interfered with by the construction of the tramways. The Engineer duly attended the meeting; and

it was agreed, after consultation, that he and the Deputy Borough Surveyor should jointly draw up a report as to the best means for the relaying of any gas mains and service pipes as was necessary—the Surveyor being instructed to meet the requirements of the Company in all cases where the mains were endangered, or the supply of gas interfered with.

A report was accordingly drawn up by the Deputy Borough Surveyor and the Company's Engineer jointly. It was signed and presented to the Streets Committee, and was eventually submitted to the Council, and agreed to. The report advised that, in certain places and districts where mains would be interfered with, new mains should be laid either on one or on both sides of the street, and the service-pipes renewed and attached to the mains. From time to time, too, notices were sent by the Gas Company according to the terms and conditions of section 39 of the Order; and during the whole work the Company's Engineer and the Deputy Borough Surveyor agreed to the alterations that were required. In October, the portion of the work devolving on the Gas Company having been completed, an account, amounting to £1772, was forwarded to the Corporation.

Considerable negotiations afterwards took place respecting the liability of the Corporation under the section, and which to a certain extent had been strengthened by the joint report of the Deputy Borough Surveyor and the Engineer to the Company. The question arose as to the interference with the pipes of the Company and the impeding of the flow of gas in the mains. The Company contended that they should not wait until such interference had actually arisen, but that any alteration or laying of new mains should be done at once, so as to prevent any accident, loss, or damage arising after the construction of the tramways, and not to wait until that had actually occurred before laying the new mains. In the report, it was suggested that the service-pipes should be cased with another pipe, so that the former could be drawn through for repairs and renewal at any time. But the difficulty arose as to the repairs to mains, or the relaying of mains where necessary, and which lay immediately underneath the proposed railways. It was further considered in the report that, after all, the cheapest and most effectual mode of meeting the difficulty would be by laying a service-main on each side of the street—thus really doing away with the necessity of opening the ground at any future time for the laying of mains or the renewal of service-pipes. This latter plan was adopted. Most of the roadways have been covered with wood pavement on concrete foundations; and the renewal of trenches opened in this costly road would in two or three years greatly exceed the ultimate cost where new mains have been laid. In most cases the old pipes have been taken out of the ground, and delivered to the Corporation. A useful point may be mentioned here. Photographs were taken of the various districts in which the operations proceeded; and these were of great value in the determination of the liability of the Corporation for the work executed.

The British Electric Traction Company had entered into an agreement to lease these tramways for a period of 21 years from the Corporation, upon the condition of paying a certain percentage of interest "upon a properly expended capital;" and therefore in the settlement of the account, the Traction Company were consulted by the Corporation as to whether or not they approved of the outlay. From time to time, certain offers were made by the Corporation for the reduction of the account, which the Company refused. Several important matters were involved in the communications; but these were settled to the satisfaction of both parties. Ultimately it was wisely agreed by the Gas Company to accept the sum of £1500 in settlement of the claim (£1772); thus avoiding the necessity for a costly arbitration.

Effects of Electrolysis.—Electrolytic action on lead-lined service-pipe in a water-works service connection crossing under an electric railway track in Reading (Mass.) so badly disintegrated the iron in one place, according to the annual report of Mr. Lewis M. Bancroft, the superintendent of the water-works, that the thin lead lining alone remained.

Manchester District Institution of Gas Engineers.—The 142nd quarterly meeting of the Institution will be held next Saturday at Leeds, where there will be an inspection of the New Wortley Gas-Works, on the invitation of the Gas Committee, who will provide light refreshments. The business meeting (which will be held in the Council Chamber of the Leeds Town Hall, by permission of the Lord Mayor), will include the consideration of some proposed alterations of the rules, recommendations of the Committee with regard to the establishment of the Question-Box system, a paper by Mr. J. C. Belton, of Chester, and a discussion on the address of the President (Mr. S. Meunier) delivered at the February meeting.

North British Association of Gas Managers.—As in previous years, the Secretary of the Association (Mr. R. S. Carlow) has issued a circular informing the members that the Committee are now making preparations for the approaching annual meeting, which will be held at St. Andrews on the 27th and 28th of July, and inviting their assistance in rendering the meeting equal in point of interest to its predecessors by contributing papers on any subjects to which they may have been giving attention. If they have no special subject in view, Mr. Carlow refers them to a full list accompanying his circular, and presenting a wide range of topics. Intimation of their intention to comply with his request should be sent to him not later than the 29th of June.

OPTICAL PYROMETRY.

For some time, Dr. Charles Fery, of Paris—who is associated with the Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz—has been engaged in the investigation and improvement of methods of pyrometry. To understand the latest development of his work as exhibited in his English patent specification No. 18,382 of 1904, just published, it is necessary first to review in outline some of his preceding experiments and the pyrometers associated therewith.

For the measurement of the temperature of flames, he found that no pyrometer which involves the introduction into the flame of matter to be heated (the wires of a thermo-couple, for instance) can be accurate, on account of the conductivity of the wires and consequent loss of heat, and also by reason of the disturbance of combustion. Other investigators have shown that the thickness of the wires may influence the indication of temperature; the thinner wires giving results that are more accurate than the thick ones. M. Fery accordingly determined a series of flame temperatures by ascertaining the moment when a sodium line in the flame was just reversed by the light from a carbon filament which was gradually raised in temperature by increasing the current through it. The temperature of the filament was measured by an absorption pyrometer depending on the formula of Wien, which expresses the relation existing between the intensity of luminous radiation with the temperature. In this way temperatures were ascertained varying from 1705° C. with the free flame of alcohol to 2548° C. with acetylene.

M. Fery has constructed also a pyrometrical telescope, which is based upon the law discovered by Stefan and defined by Kirchhoff, according to which the amount of heat radiated by a dark body, or by an aperture, in a furnace urged to a high temperature, is proportional to the fourth power of the temperature of that body or furnace. A dark body is defined as one which emits all the heat rays in normal proportion on being raised in temperature. This law he has applied also to the construction of an optical pyrometer, in which use is further made of the fact that above 900° C. the quantity of heat absorbed by fluorspar bears a constant ratio to the amount of heat transmitted, with the result that the determination of the latter renders the former determinable.

There has been of recent years a growing conviction—especially in France and Germany—that the difficulties besetting the use of pyrometers inserted in a furnace, or in contact with hot material, may be best overcome by an optical instrument. Several forms have been devised, but the one by Professor H. Wanner merits special attention here, because it is essentially a photometric instrument, and is based on the law theoretically enunciated by Wien as above mentioned, and confirmed experimentally by Professors Paschen, Lummer, and Pringsheim. Summarized, these researches are as follows: If, without paying attention to the changes of colour of a substance with rising temperature, one observes the intensity of a certain colour—that is, of a narrow part of the spectrum—one finds that, with the rise of temperature, the intensity of the selected luminous rays increase very considerably. Cutting off, for instance, by means of a screen, from the spectrum produced by a glowing body—say, a furnace—all the light except the narrow part corresponding to Fraunhofer's "C" line, and taking the intensity of this red light, at 1000° C. of the furnace, as being equal to unity, the intensity at 1200° C. is ten times as great; at 1800° C., 804 times as great; and at 2000° C., 2134 times as great.

Taking I to be the observed intensity of the rays, T the absolute temperature, λ the wave-length of the part of the spectrum used, c_1 and c_2 two constants, e the basis of the natural logarithms, the following is Wien's formula or equation which connects the values:—

$$I = \frac{c_1}{\lambda^5} \times e^{-\frac{c_2}{\lambda T}}$$

which applies strictly only to so-called absolutely black bodies.

As there is no measure by means of which intensities of light can be determined, a comparison must be made of the intensity of one source of light with that of another. Assuming I_0 to be this comparison measure, and T_0 the corresponding absolute temperature, it follows, of course, that

$$I_0 = \frac{c_1}{\lambda^5} \times e^{-\frac{c_2}{\lambda T_0}}$$

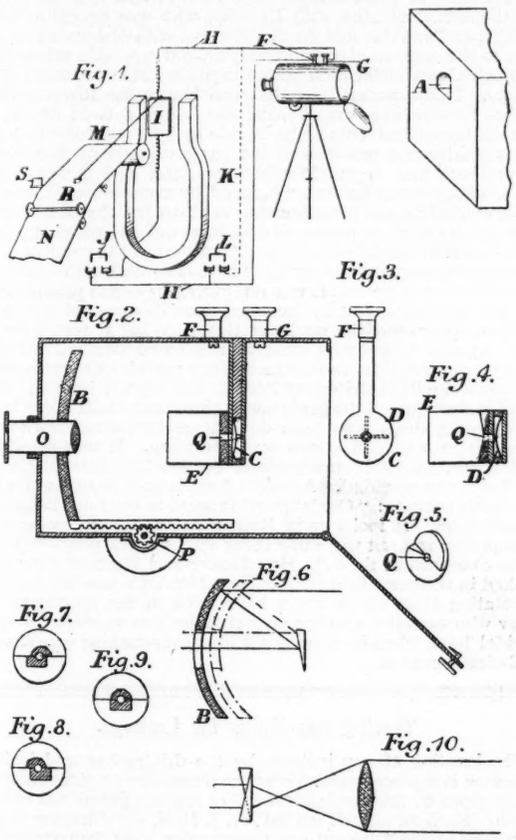
and

$$\frac{I}{I_0} = e^{-\frac{c_2}{\lambda}\left(\frac{1}{T} - \frac{1}{T_0}\right)}$$

If I_0 and T_0 are known—viz., the standard measures—and also that of I and c_2, there is left only T as an unknown number, which can be ascertained by calculation. This is done by observation and reading off the scale of a Wanner optical photometric pyrometer where the intensity is measured by polarization. A small electric, six-volt glow-lamp is attached to the end of the apparatus which is directed towards the light under observation, and the light from this is also admitted to the apparatus, and utilized for the purpose of comparison with the intensity to be measured. On looking through the apparatus, the circular field of vision is seen to be divided into two halves, one of which is

illuminated by the little electric light and the other by the light of the body under observation—the coloration being red. By inserting a rotating eye-piece containing a Nicol prism, the intensity of the two halves of the field of vision is easily equalized. The angle of rotation is measured on a circular scale; and by reading the angle, the temperature corresponding to it is found in the table which accompanies the instrument. The instrument is standardized by comparison of the radiations of a black body constructed by the Imperial Institute at Charlottenburg; and any variations in the glow-lamp are checked by comparison with an amyl acetate flame.

The importance of the optical pyromoter may be gathered from the remarks, on a recent occasion, of Professor H. Le Chatelier before the Iron and Steel Institute. He was gratified to see the interest accorded his researches in pyrometry and the success which had attended his thermo-electric thermometer. He thought, however, that, in view of the inevitable alteration in the platinum couples at high temperatures, the future would belong for measuring temperatures above 1000° C. to radiation pyrometers. He had been surprised to see that the employment of his optical pyrometer, and of similar apparatus of more recent date—such as that of Wanner and of Lummer, for example—had not become more widespread in metallurgical works. He thought some slight misapprehension existed in certain quarters as regarded the difficulties involved in photometric measurements. A very ordinary degree of



accuracy was required in these measurements, for the radiancy of incandescent bodies varied, according to temperature, with such swift adhesion to the law which determined these variations that errors amounting to 25 per cent. on the observed luminous intensities did not greatly affect the result.

Other evidence from practical workers could be adduced as to the trustworthiness of the temperatures deduced from the photometry of light from "black bodies" or their approximate equivalent; but the principle is admittedly inapplicable to non-luminous flames. Upon this point, Dr. A. Weiskopf, of Hanover, says "the determination of the temperature of colourless flames cannot be effected by the optical pyrometer, for the reason that the radiation of the flame differs so greatly from the radiation of a dark body that the law of Wien is no longer applicable."

It will now be possible to understand the relative position occupied by Dr. Fery's new instrument. It is one dependent upon the heat radiations received from the body under observation, and is therefore applicable to a luminous or non-luminous source; the heat rays being concentrated by a reflector and focussed by optical means, so that they act upon a thermo-electric couple. This couple, placed within the "telescope," is connected by wires to a galvanometer, which apparatus moves a pointer terminating in a pen that records (upon a continuous band of paper) the temperature existing at intervals of one minute.

The method of carrying out these two main principles is clearly set forth in the patent specification and in the diagrams attached to it, of which the following is a summary. Fig. 1 is a diagram of the apparatus as a whole; fig. 2 is a sectional elevation of the "telescope" part; figs. 3, 4, and 5 are details of the latter; figs. 6, 7, 8, and 9 are to illustrate the effects of the focussing of the reflector (marked B) in fig. 2; fig. 10 is a modified optical arrangement alternative to fig. 6.

The telescope in fig. 1 is arranged standing on a tripod opposite an aperture A, formed in the wall of the furnace of which the temperature is to be recorded. This telescope concentrates the radiations received from the furnace on a thermo-electric battery, arranged so that its soldering receives the calorific rays concentrated by the mirror B. The battery is constituted by two metallic strips C D, placed at the end of a tube E and formed by means of iron and constantan—metals of a high thermo-electric power. The poles of this battery are connected with two terminals F G, which form the two extremities of a line wire H, in which is inserted the frame I of a suitable galvanometer. The frame may be separated from the line H by means of a fork J immersed in two mercury cups inserted in the line H and forming an interrupter. The frame may also be withdrawn from the action of the current of this line by placing it in short-circuit at a conductor K by means of a fork L immersed in two mercury cups suitably arranged for the purpose. Finally the I actuates a needle or pointer M, the displacement of which may be recorded by a continuous band N suitably actuated by clockwork. Further details are given as to how to focus the instrument by observation through the ocular O and by turning the screw; correct focus being indicated by the two halves of the image formed at Q being coincident—as in fig. 9, and not as in figs. 7 and 8. Details of the recording arrangement are given showing how the pen R records in dots, at predetermined intervals, and how at longer intervals it is made to dip into the inkpot S.

We hope that, when the instrument has been applied to practical work—and especially to the exacting conditions of a modern gas-works—we may learn what success has attended this, one of the latest inventions in pyrometry.

New Coal Handling and Crushing Plant for Bristol.

We learn that Messrs. Graham, Morton, and Co. have received information that the Bristol Gas Company on Thursday placed another large contract with them for the complete coal handling and crushing plant required for their Stapleton Road works. The whole of the work is to be constructed and erected to the designs of the Engineer, Mr. D. Irving.

Self-Reliance in Workmen.

One need not (writes Mr. W. D. Hunter, Engineer of the Rotherhithe Gas-Works, in the May issue of the "Co-Partnership Journal" of the South Metropolitan Gas Company) have had many years' experience with his fellow-creatures to learn how varied are the men with whom one has to deal, and how varied are the views with which they look upon life and its duties. But upon the principles that they lay down and carry into effect, depend their success and comfort. We all know men who evidently quarrel with life. Nothing either is or can be right with them. Neither do the actions of employer or fellow-worker meet their approval, and only necessity compels acceptance. They pass an existence of continuous discontent with themselves and everyone else, and, looking outside and beyond, never realize that the fault may be their own—and very frequently it is. They forget that only by work and diligent attention to duty can any of us make our way in the world, and command the respect of those by whom we are employed. It is exceedingly painful to deal with men who are continually unmindful of their opportunities, and careless not only of their present but also of their future condition. An employer finds more pleasure and satisfaction in seeing men caring for themselves and their homes than in finding that those around him are deficient in elevating influences. It is sometimes said that a master cares more for his machinery than for his men. But a man who has insured respect for himself very rarely fails in having it appreciated by his employer, who usually looks upon self-respect in his workers as a guarantee of their stability of character and reliance in dealing with his affairs. Our Co-Partnership certainly makes it easy for men to work heartily and find it appreciated, as many who have experienced life's hardships and rebuffs, and have not become soured, will freely confess. These men have braved many difficulties, but have stiffened themselves and have finally come through the ordeal with a smile, and ready to overcome fresh obstacles. These are the men that one is glad to be surrounded by, and it is a pleasure to deal with them; for, however troublesome the duty may be, their genial personality will steer them safely through, and carry out whatever in reason may be desired. It is this type of man, with unlimited courage, backed up by perseverance, that is wanted in building up and maintaining any industry requiring intelligent application. The extended experience of this man becomes valuable, not only to himself, but to those by whom he is employed, and the respect that he commands is shown not only in the opinion of his employer, but also in that of his fellow-workmen, who are generally very quick and generous to recognize skill and worth in those with whom they work.

ENTERPRISE AT TRURO AND THE INVENTOR OF GAS LIGHTING.

By a Correspondent.

Truro is to be heartily congratulated upon the enterprise which distinguishes the management of its gas-works. Charming as it is in many ways, the little Cornish city does not grow rapidly in population; and as compared with Birmingham, Manchester, Liverpool, and other places which have recently attained the dignity of cityhood, it is very small indeed. Mr. S. J. Ingram, the Engineer and Manager of the Gas-Works, has nevertheless succeeded in proving that even in a small community there is a great field for extension in the use of gas. In ten years the growth has been as much as 60 per cent.; and with a continuation of the same spirit as that which now characterizes the management, there seems to be no reason why it should not further expand at a rate much exceeding that of the development of the town. Happily for the success of the Company, and for the good of the city, Mr. Ingram is supported by a body of Directors animated by his own progressive spirit, who repose in him the fullest confidence. Together they have tapped some unsuspected and hitherto neglected sources both of income and profit, and, walking warily in the same course, have every hope of attaining to still greater triumphs.

It is no small tribute to Mr. Ingram's ability and the confidence which he has inspired, that the Directors decided upon his recommendation to embark upon the great experiment of installing the first methane-hydrogen plant which has ever been erected. Judging by the three months' returns already tabulated, the results of this experiment are entirely satisfactory. Those who saw the plant in operation at the inaugural ceremony on Wednesday week were unanimous in their expressions of approval of its simplicity of action and smooth running. The fact that the whole operation is controlled by one lever is a great point in its favour; while the low working cost, as shown in the production of 4½ million cubic feet of gas with benzol enrichment at less than 9d. per 1000 cubic feet, is a factor to be appreciated. Both Mr. C. B. Tully, the inventor of the process, and Messrs. Biggs, Wall, and Co., the Contractors for the plant, are to be congratulated on the measure of success which the initial installation has achieved. More will no doubt be heard of the process; and some portion of the intense conflict which has raged over the merits of carburetted and blue water gas will probably be transferred to their newest rival, the methane-hydrogen system. Professor Lewes, whose researches are acknowledged to have inspired the invention, claims that methane hydrogen is an ideal diluent for coal gas because of its richness in hydrogen and the comparatively low percentage of carbon monoxide which it contains. Whatever may be the differences upon these points, there can be little doubt that a formidable rival to other systems of water-gas making has arisen, and that in the immediate future a good many eyes will be turned towards Truro.

As the inventor of gas lighting, William Murdoch, in the opinion of most people, received much less than his due. He certainly never made out of it anything like the money which it would have yielded if he or Boulton and Watt had taken out a patent for the invention. As it was, he had the mortification of seeing his claim to originality challenged by Lebon, and the fruits of his discovery largely reaped by Winsor and others. In recent years tardy posthumous honours have been paid to his memory as the inventor of a system which has added so much to the comfort and convenience of the world that it may be said to have transformed it. It is, indeed, no exaggeration to say that, without gas lighting, the immense strides in civilization which the last century witnessed would have been impossible. The inventor of gas lighting thus has claims to stand among the higher hierarchy of world benefactors. Now, however, more than a hundred years after the great discovery, we are told that the honour is due not to Murdoch but to another. France, we know, ascribes the invention to Lebon, although in the matter of actual dates it would seem that Murdoch was an easy first. But according to Major Mead, the Chairman of the Falmouth Gas Company (whose remarks on the subject were reported in last week's Journal, p. 294), there was one hitherto unknown to fame who anticipated any and every other competitor. This was a man named Hornblower, a drunken millwrignt, who carried on business at the village of Ponsanooth, in Cornwall. According to Major Mead—whose authority seems to have been a person named Rapson, a contemporary of Hornblower and Murdoch—the discovery was introduced in a casual sort of way by Hornblower; and the first building lighted by gas was not Murdoch's house at Redruth, but a shop near Penryn. Murdoch, it is suggested, appropriated the discovery and developed it; while Hornblower, who in after years drifted out of sight, never laid any claim to it.

While it is possible that the story has a substratum of truth, and may at least have been believed by Rapson, it lacks some elements of probability. In the first place, it seems extremely improbable that Murdoch was ever apprenticed to Hornblower. Murdoch was a Scotsman; and the first recorded evidence of his appearance South of the Tweed was when he arrived at Birmingham to seek employment at Soho. From this time he continued associated with Boulton and Watt. When he went to Cornwall, it was as a mechanic in the employ of that firm, to superintend the erection of pumping-engines for the copper and tin mines. There was then in Cornwall a family named Hornblower. The first of them, Joseph Hornblower, had arrived there many years before to superintend the erection of some of Newcomen's atmospheric air-engines. Joseph's son Jonathan, and his grandsons Jabez, Jesse, Jethro, and Jonathan were all engineers, and were all keen rivals of the Boulton and Watt firm. In his early connection with the county of Cornwall, Watt found the first Jonathan Hornblower a thorn in the flesh; and though the family were afterwards employed in erecting Watt's engines, this did not prevent them trying to introduce a new engine which was to beat Watt's invention out of the field. It is probable that the Hornblower referred to by Major Mead was a member of this family, and that Murdoch knew them and may have actually worked with them when they were engaged in erecting engines as fast as they could be turned out for the Cornish mines. There is, however, no record of this so far as is known; and the date given for his original experiments in the manufacture of coal gas rather tends to negative the supposition. It was in 1781 that Watt began to have fears that the Hornblowers were endeavouring to steal the credit of his invention of the steam-engine; and from this time onwards for several years he was fighting these and other rivals.

The subject of the distillation of coal engaged Murdoch's attention certainly in 1792, and perhaps earlier; and it is suggested that the idea originated with Boulton, who was an enthusiastic chemist, and had devoted much attention, with Murdoch's assistance, to the analysis of earths, minerals, and vegetable substances. Murdoch's own declaration upon the subject at least admits of no dispute. In the paper which he read before the Royal Society in 1808, for which he was awarded the Rumford Gold Medal, he spoke of the experiments he had made in 1792 at Redruth upon the quantities and qualities of the gas produced by distillation from mineral and vegetable substances, and said it was in the course of these that he was "induced by some observations he had previously made upon burning coal, to try the combustible property of the gases produced from it, as well as from peat, wood, and other inflammable substances." Although the result of these experiments was the lighting up of his house and offices at Redruth at this early period, it was not until 1803—nine years later—that gas lighting was really launched upon its career of usefulness by the lighting up of the works at Soho. What it would be interesting now to know is what year is to be ascribed to Hornblower's original discovery, if he has any real claim to the honour, and when the little shop near Penryn was lighted by gas. It is possible that this erratic genius, who signalized his drinking bouts by inventing ideas, may have done some tentative work in the direction in which Murdoch was operating. It was an enterprising age, a period remarkable for the development of the inventive faculty in mankind. As Watt complained in one of his letters to his partner: "One's thoughts seem to be stolen before one speaks them. It looks as if Nature had taken an aversion to monopolies, and put the same thing into several people's heads at once to prevent them." Hornblower and Murdoch may have worked in the same field; but unless Murdoch was deliberately mis-stating facts which must have been in the recollection of many who were living in the year 1808, he was working on quite original lines when he carried out his epoch-making experiments at Redruth in 1792.

Tracing Gas-Mains for Leakage.

The location of any leakage by the driving-bar and leakage indicator is a process which is not unattended with risk of damage to the pipes by the careless driving of the bar, regardless of their depth. Such an experience led Mr. J. Holt, the Outdoor Superintendent of the Glastonbury Corporation Gas Department, to hit upon the following simple means to prevent such damage occurring; and as it has proved to be absolutely reliable, he submits it for use by any engaged in the work. The plan consists in the adoption of a small portable electric bell set, made up of two dry cells and a 3-inch gong bell, screwed to the inside of the containing box, which need not exceed 12 in. by 6 in., with a suitable handle for carriage, two 1-inch steel bars, and two lengths of wire. To trace the pipe through a road, it is necessary to open down on to (say) a socket at the commencement; then fix No. 1 bar upright on the joint in such a manner that there is perfect contact between its point and the metal of the pipe. The next step is to connect this with one terminal of the battery by means of a short wire with a clip for the bar, somewhat in the shape of a paper-clip; bar No. 2 being similarly connected with the other terminal of the battery by a wire depending upon the length desired, or whether it is intended to test every joint. Bar No. 2 should be driven down, and as soon as contact is made with the pipe, the bell will give the alarm. Bar No. 1 should be taken out, and the process repeated at the next joint; and so on through the whole length, putting the indicator down at each withdrawal of the bars. The principal things to be borne in mind are to keep all contacts clean, and the points of the bars sharp. Mr. Holt has found that a bar formed with a slight taper from head to point can be withdrawn much more easily than one made parallel. He will be very pleased indeed to give further information in regard to his plan.

PERSONAL.

Mr. HUGH M'NAIR, late of Portrush, has been appointed Manager of the Shotts Gas Company.

Mr. JAMES DOUGALL sailed last Friday to take up his duties as Engineer of the Buenos Ayres (New) Gas Company, Limited. Reference to his appointment was made in the speech of the Chairman (Mr. F. J. Heseltine) at the meeting of the shareholders last Thursday, as reported elsewhere in this issue. We feel sure that in his new and highly responsible post, the best wishes for success will attend Mr. Dougall from his numerous professional colleagues at home.

OBITUARY.

We regret to record the death, on Monday last week, at his residence in Dublin, of Professor CHARLES R. C. TICHBORNE, LL.D., Ph.D., &c., whose name has been frequently before our readers in connection with technical and legal matters associated with the gas industry in Ireland. The deceased was a member of a very old family; his father having been a descendant in direct line from the Sir Robert Tichborne whose name appears on the death warrant of King Charles the First. Dr. Tichborne studied chemistry under Professor Hofmann, and obtained an appointment to superintend the laboratories of the Apothecaries' Hall of Ireland, with which body he was associated for many years. He was a Governor, and also their representative on the General Medical Committee. He was appointed in 1872 Lecturer on Chemistry to the Carmichael College of Medicine, and in 1874-5 he was Extern Examiner in Chemistry to the University of Dublin. Up to his death he was an Examiner under the Joint Board of the College of Surgeons and Apothecaries' Hall. On the retirement of Sir Dominic Corrigan, Professor Tichborne was elected President of the Pharmaceutical Society of Ireland, and was afterwards made Professor at that Society's School of Chemistry. He was the Gas Examiner for the Board of Trade for Ireland, and one of the County Analysts. He began very early in life to write scientific papers; and those connected with the gas industry, as well as his lectures, have been duly noticed in our columns. His latest researches were upon the subject of the purification of gas. He was the single honorary member of the Irish Association of Gas Managers; his companion—Professor W. Ivison Macadam—having, as may be remembered, met his death, at the hands of an assassin, in 1902, when Professor Tichborne filled his place as lecturer at the annual meeting. He was elected an honorary member in 1892, when he lectured on the value of residuals. In 1899 he delivered a lecture on "Continuous Gas Testing," and another in 1902 on "Carburetted Water Gas"—following this up next year by giving some details in regard to the estimation of carbon monoxide in this gas. Professor Tichborne was either an honorary or a corresponding member of several foreign societies. At the funeral, which took place on Thursday, in Mount Jerome Cemetery, there was a large attendance of the friends and professional colleagues of the deceased; and among the numerous and beautiful floral tributes was a wreath conveying the regret felt by the members of the Irish Association at his removal. His loss will be greatly felt by Irish Freemasons, as he was an ardent member of the Craft.

Recent Wills.—Mr. W. R. Taylor, of Selby House, Harrogate, one of the Directors of the Shotley Bridge and Consett District Gas Company, left estate of the gross value of £51,495. Mr. Alfred Preston, one of the Directors of the Gas Purification and Chemical Company, Limited, left estate of the gross value of £22,242.

"Gas-Engines and Producer-Gas Plants."—We have received from Messrs. Crosby Lockwood and Son a volume bearing the above title. It is a translation of a treatise by M. Mathot on the principles of gas engine and producer design, the selection and installation of an engine, the conditions of perfect operation, the possibilities of producer-gas engines, the care of engines and plant, &c. The translation has been made by Mr. W. B. Kaempffert, and there is a preface by Mr. Dugald Clerk, who was personally acquainted with the author. We hope to notice the work more fully in an early issue.

Coke Production in India.—The "Englishman" (Calcutta), referring to the expansion of the coal industry in Bengal, and the corresponding increase in the output of coke, says that experiments have been conducted by several of the leading firms interested in the coal industry, with a view to the adoption of a bye-product system. The principal bye-product obtainable in the manufacture of coke is ammonia, for which there is not at present a very large demand in India. But its value as a manuring agent is well recognized; and if it were produced in sufficient quantity, a demand would unquestionably arise for it. The experimental stage of the schemes referred to is nearly at an end; and plant capable of making thousands of tons of coke by the most approved method is likely to be ordered within the next few months.

THE BESEMFELDER PROCESS FOR THE DIRECT GASIFICATION OF COAL.

In the course of an article recently published in the "Journal für Gasbeleuchtung," Dr. Keppeler has called attention once again to the difficulties in the way of a successful gasification of raw coal in the water-gas generator, and has described, as a considerable advance in the economy of water-gas manufacture, a process worked out by L. Payens, of Nymwegen; but he has not mentioned a scheme elaborated with the same object in view by Dr. E. R. Besemfelder, of Charlottenburg.

The objections to using raw coal as the fuel in a generator depend upon the formation of tar, upon the bad heat-conducting power of coal, upon the endothermic nature of the reactions of carbonization, and upon the lengthiness of that operation (which is brought about by the two last-mentioned causes) in comparison with a gasification process. The desire to employ coal in the manner indicated is, of course, based on a wish to save the fuel otherwise consumed in converting it into coke, and to retain as perfectly as possible the energy that leaves the water-gas generator in the shape of sensible heat. As the Besemfelder process goes further in the direction of economy than that elaborated by Payens—for it aims at the recovery of the heat which is usually wasted when the gasmakers' coke is quenched between its exit from the retort and its entry into the generator—the author (Besemfelder) takes the present opportunity to point out the features that distinguish it.

The Besemfelder process is carried out by feeding small coal into a special kind of flat retort, which is connected with a battery of water-gas generators in such fashion that: (1) The coke resulting from the carbonization passes directly into one of the generators without loss of heat; (2) the retort is partially heated on its outside by a combustion of the generator gas after suitable admixture with air; and (3) is partially heated inside by the passage of the hot water-gas over and among the fuel it contains. The size of the carbonizing vessel is so calculated in relationship to that of the generators that coal may be fed to it in an uninterrupted supply; it is so long that the coal is completely carbonized by the time it reaches the generating plant; and it is of such area that, when crushed to the size of nuts, the coal forms a layer on the bottom of the vessel only about 20 centimetres deep. A hydraulic main is provided in the retort close to the charging spot; so that the tar is withdrawn very rapidly from all sources of heat. Hence it is assumed as free from naphthalene and uncombined carbon, and, according to Börnstein's experiments, to contain numerous bodies of the aliphatic series which render it a more valuable raw material to organic chemists than the more purely aromatic tar of the ordinary gas-works.

The intimate contact between the small coal passing through the carbonizer and the hot water gas travelling in the opposite direction encourages the rapid liberation of gas, neutralizing the retarding effect generally produced by the low heat-conducting power of the coal. Baffles on the bottom of the vessel assist in maintaining this contact, while the current of gas prevents the formation of gaseous cushions round the coal which ordinarily hinder the transfer of heat. Moreover, any water vapour or carbon dioxide in the water gas is decomposed by the hot coal through which it passes; being almost entirely reduced to hydrogen or carbon monoxide. It may be said that the carbonizing vessel acts as a regenerative chamber in which the coal takes the part of the usual chequer-work. The specific heat of the coal, too, rises as its temperature increases; so that, per unit of weight, it is able to take up more heat than the air which is usually run through a regenerating chamber.

By burning the generator gas with the necessary quantity of air round the carbonizing vessel, the sensible heat it contains and the latent heat due to the carbon monoxide in it are recovered. Keppeler regards it as an admirable feature in the Payens process that the sensible heat in the water gas and that in the generator gas should be utilized separately for raising the steam required. In the Besemfelder process, the sensible heat in each gas is also used separately, though for a common purpose. The economy of the latter is greater than that of the Payens process, inasmuch as the heat which is needed to drive the volatile matter out of the coal is not only obtained from the escaping gases of the generator, but may be said to be largely returned to the "coal" [? coke] "so that a notable proportion of that heat remains available for raising steam."

Success in the Besemfelder process is not so dependent, as is generally the case, upon the valves being altered at the correct moment. All that is necessary is that the generators shall be uniformly charged with uniformly carbonized coal at a constant temperature, and therefore it is quite possible, while working upon a particular kind of coal, to make the valves change automatically, in a more accurate manner than can be achieved by the most willing hand labour. The process has another advantage over the Dellwik system, in that at any moment there are always the same number of generators being run and being blown; so that the demand for steam and for air is always the same, and the boilers and blowing engines are able to work more efficiently. In fact, a blowing engine large enough in the usual way to supply one

water-gas generator of a given capacity will be found sufficient for all the (same sized) generators of the plant, because the blast does not have to be shut off at intervals. As regards the economy arising from the insertion of coke in a state of incandescence in the generator, it has been shown by E. Blass, of Essen, and the present author, that the amount of heat wasted when coke is quenched and afterwards raised to the temperature of the water-gas apparatus is appreciably greater than the quantity of heat needed to carbonize an equivalent weight of coal.

Of all processes, the Dellwik yields the largest volume of pure water gas, and turns it out of the generator at the highest temperature. The Besemfelder method of working is therefore best applied to that process. Nevertheless, there is no necessary connection between the two. The larger the quantity of generator gas that can be burnt outside the carbonizing chamber, the smaller is the quantity of water gas that must be passed through the interior—*i.e.*, the smaller is the quantity of coke that must be gasified; and hence it becomes possible to make a mixed gas which only contains an amount of water gas that has been sufficient to expel and fix the gases of distillation. The amount of heat required to carbonize 1 kilogramme of coal is 400 calories at most, even allowing for all the losses of the actual process as operated on the large scale. But, as the author has already demonstrated, 2020 calories of sensible heat are carried away from the Dellwik generator for every kilogramme of coke gasified, or 0·2 kilo. of coke should suffice to carbonize 1 kilo. of coal. If, then, a market can be found for the excess of coke, the present process is a means of making an illuminating gas very similar in composition to coal gas. In the well-known process called "auto-carburation," cold water gas is introduced into coal-gas retorts, and cools them; in the Besemfelder process, the water gas is hot, and heats the retorts. The consumption of fuel for the external firing of the retorts should therefore be larger when the "auto-carburation" plan is followed; and, in the author's opinion, further practical experience only is needed to prove this.

Without throwing aside any coke, it is possible to make about 11,500 feet of coal gas and about 54,000 feet of water gas from one long ton of coal by the author's process; the product having so nearly the properties of blue water gas that it can be employed for almost every purpose in place of the latter. The suggested method of working recovers all the heat stored up in the original coal in the most economical manner possible, and also brings about a most favourable conversion of the nitrogen into ammonia.

PROGRESS IN GAS MANUFACTURE IN ENGLAND AND AMERICA.

(*Concluded from p.* 296.)

Having dealt with the improvements effected in connection with manufacturing plant, Mr. Butterworth passes on to review the progress made in the distribution department.

Street Mains and Appliances.

So-called "universal" cast-iron pipe is coming considerably into favour. Its manufacturers are now making 12-inch and 14-inch sizes, and they expect soon to add the 16-inch size. One firm has made an improved service-cleaner and has also produced a rotary drip-pump. Another concern has brought out a gas-leak indicator, based on the principle of the diffusion of gases, which is coming into use and giving good satisfaction. The same firm has brought out a pocket pressure-gauge and a dry portable pressure-recorder. An Eastern main-laying firm uses a 15-horse power electric motor for testing high-pressure lines at 75 lbs. pressure. A patent gas-main stopper for 60-inch mains is in use in New York City; and one American manufacturer has made several shipments of gas-main stoppers to England. Methods of laying high-pressure mains have been somewhat improved. A German concern is manufacturing and selling "wool of lead" as a material for making pipe-joints, claiming for it that it is well adapted to either high or low pressures, and in every way a superior and inexpensive material for joint making.

Service Pressure-Regulators.

A perfectly satisfactory service pressure-regulator for low-pressure distribution is still a *desideratum* of the gas business, although some progress was made along this line during last year, and fairly good regulators can now be had. Gas companies generally are addressing themselves more than formerly to the attainment of good pressure-regulation at the consumer's premises, and therefore much work is being accomplished in the development of better service-regulators. A gas-meter has been brought out in England which contains a pressure-governor in its interior—an idea which is as novel as it is promising. An American concern is now making a "mercury relief seal" for placing between the regulator and the meter, which automatically vents into the air any gas that leaks past the regulator when the burners are turned off; thus preventing high pressure from reaching the meter and burners.

Pressure Boosters.

The use of fans and blowers in the holder outlet for increasing the pressure in the street-mains during the hours of maximum consumption is growing throughout America, and is being adopted to some extent in Great Britain. A steam-turbine, directly connected to a fan-blower, is one form of booster that is being used for this purpose in both countries.

Consumers' Meters.

Tools are being made by two meter manufacturers in America for getting out a new style of 5-light meter, which will have very large valves and openings; giving the meter a much greater capacity than the present 5-light one, and enabling it to take care of occasional overloads. The ultimate success of such a meter is, however, yet to be determined. A "discount meter" has recently been put upon the market in England by the inventor of the rotary station meter, and constructed somewhat on the same lines, that is very interesting and promising. It is designed for measuring the gas supplied at a reduced price to gas-fires, &c., near which it is to be attached; the amount of its registration being deducted from that of the meter which measures all the gas consumed on the premises. This meter is said to be entirely successful, and by its uniqueness, smallness, and cheapness constitutes a radical departure in consumers' meters.*

Prepayment Meters.

The use of prepayment meters in Europe continues to increase, and has reached large proportions. For instance, in October last one of the Gas Companies in London had 156,000 of these meters in use, requiring the work of 116 men in the collection of pennies. The use of prepayment meters is also increasing in America, but not nearly so rapidly as abroad. This, however, is partly due to the fact that American gas companies do not think it is to their advantage to push them. One concern brought out during the past year what it considers to be a burglar-proof cash-box; the lock being placed inside instead of outside the box. An English firm has improved its prepayment meter valves by making them more nearly gas-tight; and most manufacturers have effected some improvements. The maker of a prepayment meter attachment in America has adopted a new safety valve for the prevention of accidents due heretofore to the gas going out and then coming on again. It consists of an auxiliary valve that allows a small quantity of gas to continue to flow after the main valve has closed. If after a considerable length of time another coin has not been placed in the meter, this auxiliary valve also closes, shutting off the gas and eliminating all danger. An English manufacturer is making a "change-giving attachment," to overcome the inconvenience arising from the collection of a large number of pennies. When the dial shows that six pennies are in the box, a sixpenny piece is dropped into the slot in place of them—the six pennies coming out for further use. No more than eight pennies can be in the box at one time. This results in the collection of sixpenny pieces only, instead of pennies.

The next section of the report relates to appliances and burners.

Gas-Ranges.

Gas-ranges are still being gradually improved from year to year in many minor details. The use of asbestos as an insulating material is decreasing to some extent; the double body with air space now being considered preferable by many gas companies. One manufacturer has substituted a heavy galvanized steel rod in place of the cast-iron supporting bar, and extra heavy pipe for the manifold as offering a greater thickness of metal for the gas-cock threads. The burner orifices are now easily adjusted by means of so-called thimbles; and the burner-cock handles do not project beyond the pipe, and so are protected from being accidentally moved by the operator. The oven burners are removable by simply lifting them through the oven door without touching any bolts or linings. Swing doors, instead of drop doors, are coming somewhat into favour again; and at least two manufacturers have brought out safety pilot-lights for oven burners which compel the operator to open the lower oven door before lighting the burners, thus preventing explosions. Most stoves are now equipped with die-made and interchangeable oven linings, easily removable by hand. One concern has provided an extra air space underneath the bottom oven to ensure a cool floor. Ranges with elevated ovens are coming rapidly into favour; several concerns now making them. An English gas-stove company have brought out a hot-water circulating attachment for gas-ranges, so constructed as to utilize the waste heats of the products of combustion for pre-heating the water. Two or three English firms are also placing in the front doors of their stoves neat and effective "heat indicators" of several kinds. Some novel forms of gas-ranges have recently been brought out in England, equipped with safety devices and self-lighting burners. One stove has baffle-plate top burners which send the products of combustion out of the room.

Water-Heaters.

One or two new makes of these heaters were placed upon the market during the past year in America, although the tendency seems to be towards the circulating type of heater. One manufacturer has equipped his heater with a thermostat which automatically regulates the temperature of the passing water, and with a burner that shoots the gas-flame from one side only, preventing back-flashing. Another has equipped his heater with a "gas-locking" device, which renders it impossible to turn the gas on to

* See "Journal," Vol. LXXXVI., p. 439.

the main burner without first lighting the pilot. One concern has improved its circulating water-heater by substituting a burner with an adjustable gasway. Many manufacturers have so constructed their water-heater burners as to make them portable and readily removable by hand; and one concern has improved the pilot by running the tube directly into the heater itself, ensuring ignition. Improved facilities have been added for cleaning the sediment out of the heater; and a burner has been substituted in which the gas can be used in either half of the burner alone or in both halves simultaneously, as may be desired, lessening the liability of explosions, and rendering the heater more flexible in its action.

Heating-Stoves and Gas-Ovens.

A gas heating-stove was brought out last year in England that has an attachment at the side for regulating the admission of the air and gas independently, so that the stove can be quickly and properly adapted to different kinds of gas. Radiating and condensing stoves have also been recently put upon the market in England. Gas-heated tubular steam-radiators were also brought out during the past year, both in America and in Europe, equipped with automatic regulators for controlling the flow of the gas by the pressure of the steam generated. There were some improvements during the year in large bread-baking ovens; and an Eastern concern brought out a new burner for large ovens for japan-baking, &c.—the air being supplied to the burner by a positive blower, and the gas being shut off automatically in case the air supply is interrupted. Heats as high as 800° Fahr. are obtained.

Mantles and Incandescent Burners.

Mantle manufacturers claim that mantles have been materially improved by the use of better methods and materials; but while complaints are much less common now than formerly, mantle experts confess that no marked improvement in the toughness and durability of mantles can henceforth reasonably be expected. An improvement in these particulars is apt to be accomplished only by a sacrifice of the light-giving qualities of the mantle. Mantles made from "Ramie"—a vegetable fibre said to be superior in many respects to cotton—are being further experimented with, and are beginning to be used to a considerable extent. A new mantle made of this material has been brought from Germany to England, the makers of which claim much for it in the way of increased durability and illumination.

Gas "arcs" for both indoor and outdoor use have been improved; one make being now equipped with an efficient governor. Arc lamps are now being made in much more ornamental designs than formerly, and one for outside use has been improved by making it non-freezing. An improved storm-proof lamp has just been brought out in England. A novelty has been introduced in England called the "under-light" burner, which is said to combine the advantages of the ordinary incandescent burner with those of the inverted type. The mantle does not hang close round the burner, but a considerable space is left between them; the light from the inner side of the mantle being thus cast downwards. Another European firm has produced simple burners which are said to yield a light of 30 candles per foot with gas at ordinary low pressure; and it has also produced a decided novelty in the shape of a burner with two mantles, one inside the other, the flame playing through the space between the two, and reported to yield 30 per cent. more light per cubic foot than the single-mantle burners. A burner has recently been produced in New York which the patentee claims gives 50 per cent. more light per cubic foot than any other. This claim will, however, doubtless be challenged by numerous makers of other burners. The result is said to be accomplished by a construction that draws into the burner 7½ parts of air to 1 part of gas, as against 5 parts with the ordinary construction. A prominent English manufacturer of gas-burners has perfected a gas-adjuster for incandescent burners which does not decrease the pressure at the point where the gas enters the mixing-chamber, resulting, he claims, in increased efficiency.

High-Power Lamps.

Lamps of high-candle power have been further developed, and are coming more and more into use, particularly in England, especially for lighting streets and large spaces and interiors. Some of the finest of London's streets are being thus lighted much cheaper and better than could be done with electricity. Burners of 1000-candle power on this system are now quite common, and 2000 and even 3000 candle power lamps are also in use. Some of these systems bring the gas to high pressure by means of electrically-driven compressors; others by means of gas-engines; and still others by water power. One system of intensive lighting is now operated by means of a dual bye-pass arrangement, which is said to be very effective and satisfactory. Another method of high-power gas lighting, called in England the "air light," brings the gas and air to the lamps through separate pipes, the air being under pressure. High-pressure and high-power gas lighting was a noteworthy feature of the great International Gas Exhibition held last December at Earl's Court.

Inverted Gas-Lamps.

Inverted gas-lamps, as now used in America, have been improved by modifying the bunsen burner so as to make it adapted to the different kinds of gas made there. The mantle has also been so changed as to increase its lighting power, now yielding, it is claimed, as high as 25·6 candles per cubic foot; while the price of the lamps has been decreased. The sale of these lamps is beginning to develop in the United States; and this system of lighting seems to be becoming quite popular and promising in England, where a number of concerns are manufacturing the burners in a great variety of designs, some of them very beautiful—the system lending itself more than any other to ornamental and decorative lighting. The Patent Office records in England indicate that invention is very active with inverted burners. There is only one concern in England at the present time manufacturing mantles for inverted burners, and it turns out from 15,000 to 20,000 per week. It is somewhat astonishing to know that inverted burners equipped with incandescent mantles are now being used very successfully and satisfactorily in England with Pintsch gas for train lighting; the mantles being especially constructed for this purpose.*

Street Lighting by Gas.

Street lighting by gas is unquestionably on the increase, both in America and in Europe. For instance, out of 76,000 street-lamps in London, 71,000 are now lighted by gas. According to a German Gas Directory for 1904, out of 980 towns in Germany, the streets of 726 are lighted entirely by gas, and partially so in 74 of the others. Marked improvements in the burners themselves, however, seem to be wholly confined to high-pressure and other forms of high-power lamps; and there has been much progress along these lines. Not only have the lamps themselves been improved, but means for lighting and extinguishing them automatically and from a distance by increasing and decreasing the gas pressure are being perfected. In one system, however, the gas is turned on and off by clockwork. It is proving quite successful; 40 towns employing it for practically all their street lamps, and 200 others for a portion of them. The development of these systems for the long-distance lighting and extinguishing of street lamps seems to further warrant the belief that street lighting by gas will eventually largely displace electric street lighting throughout the world.

The concluding portion of the report is devoted to special subjects.

Photometry and Calorimetry.

Considerable progress was made during the year in the photometric testing of incandescent burners and mantles; the "Flicker" photometer (of Messrs. Simmance and Abady) being largely used for such work. A four-way revolving jet photometer has been brought out for testing either coal gas, water gas, or mixtures thereof. There has been a great advance in the direction of improving existing gas calorimeters and designing new ones; it being now generally recognized that calorimetry will largely supersede photometry with the extending substitution of incandescent for open-flame lighting, and the increasing use of gas for fuel.

Bye-Products Coke-Ovens.

During the past year, about 630 bye-products coke-ovens, of both the Otto-Hoffman and Semet-Solvay types, were erected in the United States; making a total at the present time of about 3700. Of these, some 70 per cent. are of the first-named type. Very few non-recovery coke-ovens are now being built. A large proportion of the bye-products ovens in America are making illuminating gas in part; the Otto-Hoffman plants producing about 17 million cubic feet per day. At least one town in England is now being supplied with bye-product gas. At Sparrows Point the illuminating gas is pumped under high pressure to Baltimore, 11 miles distant; while from the Camden plant it is pumped 30 miles, to the city of Trenton. The gas to be sold for illuminating purposes is enriched either with water gas or with benzol extracted from the portion used for heating the ovens. In some plants the benzol is extracted and utilized in the form of vapour, and others in liquid form.

Electrolysis.

There is not much new to report upon this subject. Last summer the German Society of Gas and Water Engineers appointed a Commission to investigate the whole subject of damage to gas and water pipes by return currents from electric street railways; and two of their findings are of special interest: (1) It is practically impossible to so insulate mains and services as to entirely prevent their injury by electrolysis, if other conditions are favourable for electrolytic action; and (2) metallic contact between the gas or water mains and the rails must not occur, as such connections encourage the destructive action at all joints in the mains where the contact is imperfect. As to the question of liability for injury to pipes from this cause, Mr. Butterworth quotes the following letter from Professor D. C. Jackson, of the University of Wisconsin:—

The City of Dayton (O.) during the past year asked for relief from the burden on their water-works caused by the electrolytic corrosion, and it asked for an injunction to prevent the Railway Company from allowing their electric currents to enter upon, or flow along, the water-pipes. The Lower Court had passed upon the matter in a rather equivocal fashion. The Court which considered the appeal handed

* See "Journal," Vol. LXXXIX., p. 412.

down a very interesting decision, though it does not fully settle the questions at issue. The Court holds clearly that the Railway Company are liable for damage to the pipes, and enjoins the railway from operating its system with a grounded return circuit which is defective. The decision, however, appears to hold the Railway Company liable only up to the limit of the best construction available in to-day's practice with the single-trolley system. This particular part of the opinion rests partially upon questions of franchise or contracts with the city; and the obligations of a railway in respect to choice between single-trolley and double-trolley systems, under a condition where no pre-existing contract is met, have not yet been settled.

Gas-Engines and Suction Producers.

Mr. Butterworth cannot find that there was any marked advance in the construction of gas-engines during the past year; such improvements as were made having been along the lines of increased efficiency in regard to fuel consumption and regulation. The introduction and use of gas-engines is, however, still constantly increasing. For instance, the California Gas and Electric Corporation, of San Francisco, have recently placed an order for some very large gas-engines to drive three 4000 kilowatt alternators. Many gas-engine makers are now adapting and building their engines for working in connection with suction-gas producers, which are rapidly coming into general use. With these producers no gasholder or steam-boiler is necessary—the engine itself drawing the gas through or from the producer for its own use; thus automatically making its own fuel, as it were, just as it needs it. Mr. Butterworth considers this method of generating power, especially in small units, is probably the cheapest of any at the present time. He adds that while these suction producer plants may apparently be only of academic interest to gas companies, yet, as a matter of fact, they are direct and formidable competitors for a large part of the companies' most profitable industrial business, and consequently are of much practical interest and importance to them.

The Gas-Turbine.

There is increasing interest in the subject of the possibility of the development of a gas-turbine; and the success of the steam-turbine is largely responsible for it. Engineers and scientists feel quite certain that a gas-turbine will eventually be evolved, possessing great advantages over other prime movers; but so far practically all efforts towards the invention of one have been limited to discussions, calculations, and drawings. Mr. Butterworth thinks that probably the best statement of the difficulties to be overcome in the construction of a gas-turbine, and of the advantages which a successful one would possess, is the paper on this subject read last October by Mr. R. M. Neilson, of Manchester, before the Institution of Mechanical Engineers.*

Acetylene Lighting.

Although it is said that only about one-half of the works originally planned and built for the production of calcium carbide are now in operation, yet the use of carbide and acetylene is gradually, though slowly, increasing. The total world's production annually of calcium carbide is now said to be between 60,000 and 70,000 tons. It is stated that there are 330 towns lighted by acetylene from central stations, of which 121 are in the United States, 80 in France, 54 in Germany, and 16 in Great Britain. The use of acetylene for car lighting is reported to be increasing; the New York, New Haven, and Hartford Railroad Company having decided to equip 1039 cars for this system of lighting.

With a brief reference to a few miscellaneous incidents of the past year, Mr. Butterworth brings his most interesting report to a close.

THE EFFICIENCY AND PRACTICAL IMPORTANCE OF COMMON SOURCES OF LIGHT.

By Professor W. Wedding, of the Charlottenburg Technical College.

[Abstract Translation of a Series of Articles in the "Journal für Gasbeleuchtung."

(*Continued from p.* 303.)

4.—Intensified Lights.

(A.)—*The Hydro-Pressure Gas-Light.*

This must be regarded as the precursor of the high-power incandescent gas-lamps. It has not been a success in itself, because it proved too dear in working, and to some extent because the washing it effected deteriorated the gas. The author had the apparatus in hand, and for the sake of completeness extended the investigation to it. The gas was under a pressure of 3·9 inches of mercury (53 inches of water); and at a consumption of 274 litres of gas at 0°C and 760 mm. (10·2 cubic feet at 60° Fahr. and 30 inches) per hour, the illuminating power horizontally was 303 Hefners (266 candles). The distribution of the total radiation is shown by the curve in fig. 8, in which diagram the distance between any two adjacent concentric circles (the inner circle excepted) represents 200×10^{-6} watts; and similarly the distribution of the lumininous radiation is shown in fig. 9, where the corresponding distance represents 4×10^{-6} watts. The mean spherical values at a distance of 1 metre per square centimetre are, for the total radiation, $1021{\cdot}5 \times 10^{-6}$ watts, and for the light

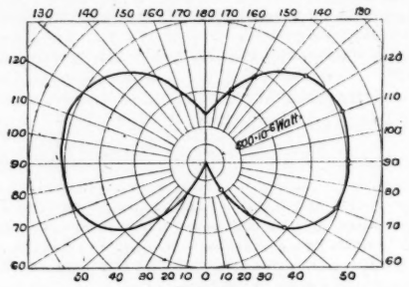


Fig. 8.

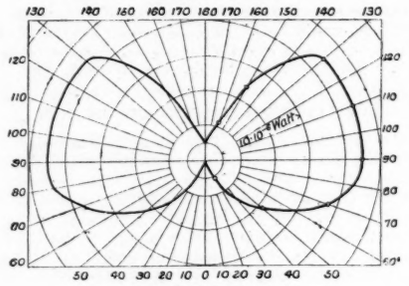


Fig. 9.

radiation $13{\cdot}85 \times 10^{-6}$ watts. The efficiency is $= 0{\cdot}108 \times 10^{-2}$. The ratio of the light evolved in the lower hemisphere to that evolved in the upper is as 1 to 1·57. The illuminating power and visible radiation developed in a horizontal direction show that the expenditure of energy is $0{\cdot}0646 \times 10^{-6}$ watts per Hefner, and therefore that on complete conversion one watt corresponds to 15½ million Hefners, or 13,600,000 candles.

(B.)—*The Lucas Light.*

The Lucas lamp depends for its enhanced lighting effect on the suction exerted by a high chimney on the gas-flame and the air supply. The lamp investigated had a telescopic chimney, and the amounts of gas and air used per hour with the chimney set at different lengths were ascertained; while the gas-nipple and pressure were unchanged. Tests of the air and gas consumption were made both with and without a mantle in position on the burner. The lengthening of the chimney had practically no effect on the rate of consumption of the gas. Its effect on the air used is shown by the ratios of gas to air given in the following table; the gas pressure at the burner being in all cases 30 mm. (1·18 inches).

Ratio of Air to Gas in Lucas Lamp.

Length of Chimney. Inches.	Volumes of Air to One Volume of Gas.	
	Without Mantle.	With Mantle.
15·35	4·21	3·90
20·5	7·03	4·20
24·4	7·76	4·63
28·3	8·86	4·61
32·3	9·42	4·73

The usual height of chimney for this lamp is the last—viz., nearly 32½ inches. The illuminating power was observed with different lengths of chimney, and the following figures were obtained; the pressure of gas below the burner being about 1·4 inches:—

Illuminating Power of the Lucas Lamp.

Length of Chimney. Inches.	Gas Consumed. Cubic Feet per Hour.	Volumes of Air per Volume of Gas.	Illuminating Power. Candles.
15·2	21·8	4·18	204
20·4	22·0	4·15	254
23·8	22·1	4·37	303
26·1	22·6	4·33	348
32·5	22·5	4·62	510
32·5	22·7	6·47	Nil (†)

(†) No mantle used in this test.

It will be seen that while the lengthening of the chimney has but little effect on the gas or air consumption, the illuminating power is greatly increased. The removal of the mantle causes a great increase in the proportion of air. The inventor of the Lucas lamp moved in the right direction when he strove to increase the

* See "Journal," Vol. LXXXVIII., p. 260.

proportion of air to gas as much as possible; but the practical limits to the length of chimney prevented him going farther in this direction by its means. He succeeded, however, in producing a lamp which, while it was independent of any mechanism, would yield a light of 440 to 525 candle power. Measurements were not made on the efficiency of the Lucas light, because those made in regard to the efficiency of the hydro-pressure gas-light and the Millennium light are applicable to it also.

It may be pointed out that as the investigations on the Lucas lamp demonstrated the extreme sensitiveness of the illuminating power to alterations in the mixture of air and gas, it may be inferred that for incandescent gas burners generally sensitive and readily accessible means of regulating the proportions of gas and air are essential. The opening out of the nipple must be considered a crude and unsatisfactory mode of adjustment, especially as it requires the removal of the mantle, and thus precludes a ready observation of change of illuminating power.

(C.)—*The Millennium Light.*

In order to obtain a light of (say) 1000-candle power by incandescent gas lighting, it is necessary to use gas-pumps with regulating and equalizing appliances. Among the best known of the systems using such apparatus is the "Millennium" light, on which a large number of investigations were undertaken. These were carried out only with the smaller burners, but are generally applicable to the larger ones also. The burner used developed, at a pressure of 54½ inches of water, a light of 280 Hefners (246 candles), at a consumption of gas per hour of 304 litres at 0°C and 760 mm. (11·35 cubic feet at 60° Fahr. and 30 inches). The distribution of the total radiation is shown by the curve in fig. 10, and of the luminous radiation by that in fig. 11.

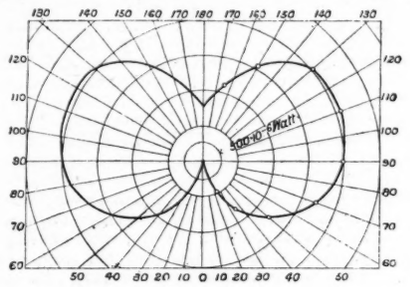


FIG. 10.

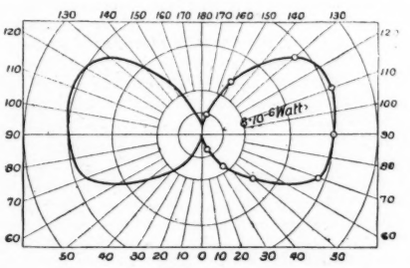


FIG. 11.

In the first of these diagrams, the distance between any two adjacent concentric circles (the inner one excepted) represents 200×10^{-6} watts, and in the second 4×10^{-6} watts. The maximum occurs at 20° above the horizontal, and is more clearly marked in the case of the total radiation. The luminous radiation is nearly the same above and below for 40° from the horizontal. This is due to the shape of the mantle, which is more or less distended by the high-pressure flame. The ratio of the light evolved in the lower to that evolved in the upper hemisphere is as 1 to 1·29. The values per square centimetre at one metre distance are for the mean spherical total radiation 1048×10^{-6} watts, and for the luminous radiation $9·4 \times 10^{-6}$ watts. Thus not quite 1 per cent. of the total radiation is visible radiation. The energy expended in developing one Hefner in a horizontal direction is $0·0499 \times 10^{-6}$ watts at 1 metre per square centimetre. Hence, on complete conversion, one watt would correspond to 20 million Hefners or 17⅛ million candles. At the stated consumption of gas, the efficiency of this high-pressure light is $0·066 \times 10^{-2}$, which is considerably higher than that of ordinary incandescent gaslights, doubtless because of the higher temperature attained. It is still, however, very low.

The Millennium apparatus, on which the investigations were made, has worked well for several months. The india-rubber bag used as an anti-fluctuator and the float are, however, liable to permit small escapes of gas, and hence the room in which the apparatus is installed ought to be well ventilated. The "Pharos" light acts without a rubber bag or float; but the system of levers by which the regulating is effected with it does not respond so quickly or exactly as the apparatus used with the Millennium light. A rotary pump is used with the "Pharos" light; and this has proved satisfactory over a trial of several months.

(*To be continued.*)

THE COAL TAR COLOUR INDUSTRY.

Report of the Departmental Committee on Industrial Alcohol.

Our readers may remember that some time ago a Departmental Committee was appointed to "inquire into the existing facilities for the use, without payment of duty, of spirits in arts and manufactures, in particular into the operation of section 8 of the Finance Act, 1902, and to report whether the powers conferred upon the Commissioners of Inland Revenue by this section permit of adequate facilities being given for the use of spirits in manufactures and in the production of motive power, or whether further facilities are required." By the terms of the reference, if it appeared to the Committee that the present facilities are inadequate, they were to "advise the further measures to be adopted, without prejudice to the safety of the revenue derived from spirits, and with due regard to the interests of the producers of spirits in the United Kingdom." The report of the Committee (of which Sir H. W. Primrose, K.C.B., was the Chairman) was presented to Parliament on the 11th ult., and has since been issued. A number of witnesses representing industries in which alcohol is used were examined; and after some introductory remarks the Committee review the evidence, and include such general observations as occur to them. The Committee deal first with the coal tar colour industry, on which they make the following remarks.

We take the coal tar industry first because it has figured very prominently in the discussions which have led up to the present inquiry. In the course of these discussions, it has frequently been asserted that the coal tar colour industry, which originated, and at one time flourished, in this country, has been lost to us very largely, if not mainly, by reason of the obstacles in the way of a cheap and untrammelled supply of alcohol. In view of the prominence given to this assertion, we thought it desirable, even at the risk of travelling somewhat beyond the immediate purpose of our inquiry, to procure authentic evidence upon the subject. With this object we invited to appear before us Dr. W. H. Perkin, the discoverer in 1856 of the first coal tar colour; Mr. R. J. Friswell, who was engaged in the manufacture of aniline dyes from 1874 to 1899; and Professor Meldola, who was similarly engaged from 1870 to 1885. We had also before us, as a witness nominated by the London Chamber of Commerce, Professor A. G. Green, whose name is associated with a well-known work on organic colouring matters. Further, our Sub-Committee who visited Germany had an opportunity of learning the views of many persons connected with the colour industry in that country.

On a review of all the evidence *pro* and *con*, we are satisfied that, regarded as a statement of historical fact, the assertion that the coal tar colour industry has been lost to this country on account of obstacles to the use of alcohol is destitute of substantial foundation. In the earlier days of the industry alcohol was used almost wholly as a solvent, and for that purpose methylated spirit is suitable. Moreover, when alcohol first began to be used as a constituent of dyes, and until some time after the decadence of the industry in this country had become marked, the margin of profit on the manufacture was so great that the difference in price even between duty-free and duty-paid alcohol could practically be left out of consideration.

It would take us too far afield to examine at length into the causes that did, in fact, contribute to the decadence of the industry in this country and to its rapid development in Germany. But much information on the subject will be found in the evidence, and here we will confine ourselves to saying that, in our opinion, the cause which predominated over all others was the failure of those responsible for the management and for the finance of the industry here, during the years 1860 to 1880, to realize the vital importance of its scientific side, and their consequent omission to provide adequately for its development on that side.

But while we say this in the interest of historical accuracy, it by no means follows that either we or the authorities we have quoted think that what was true of the period 1860-1880 is true of the present time. On the contrary, it is unquestionable that, in some branches of the colour industry, with alcohol playing a considerable part as a constituent of certain dyes, and with profits cut down by competition to a narrow margin, the circumstances under which, in respect of condition and of price, alcohol can be used have become of importance. But here, too, it is necessary to guard against exaggeration. Large classes of the coal tar colours—alizarine, indigo, and by far the greater number of the azo dyes—require no alcohol for their manufacture, either directly or indirectly; and these represent by far the larger proportion of all the colours produced. We have had varying estimates given to us of the proportion of the whole output that demands alcohol, and they range from the 10 per cent. of the German authorities to the 20 to 25 per cent. of Professor Green. Therefore, for at least 75 per cent. of the whole industry, alcohol does not enter into account even now; and these branches could be prosecuted in this country—as, indeed, they now are—whatever the conditions in regard to the use of alcohol might be.

Nevertheless, even where alcohol is not immediately required for the manufacture of a dye-stuff, the utilization of waste products and the development of new methods may be hampered by a want of alcohol; while, for those dye-stuffs for which alcohol is essential, its price and the conditions of its use are matters of great moment. We are of opinion, therefore, that, if the hope is to be entertained of recovering any considerable portion of this trade, more favourable conditions must be established in respect of the use of alcohol.

We may observe that in the manufacture of dye-stuffs, or of the intermediate products for their manufacture, the part played by methylic alcohol is far more important than is that of ethylic alcohol. Methylic alcohol is not produced by fermentation; and it was not until the process of its manufacture was perfected so as to bring it into possible competition with ethyl alcohol that it was thought necessary

to subject it to the charge of the spirit duties. This was done by an Act of 1865; and in 1898 its use was prohibited in the preparation of beverages or of medicines for internal use. Its chemical character differs so much from that of ethyl alcohol that its presence in any product can readily be detected by analysis. In view of these facts, we think exceptional treatment may be accorded to methylic alcohol.

The Sub-Committee referred to in the preceding extract from the report consisted of Sir H. W. Primrose and Dr. T. E. Thorpe, C.B., F.R.S., the Chief of the Government Laboratory. They left England on the 14th of January and returned on the 26th. Before leaving England, Dr. Thorpe addressed to Dr. Glaser—a personal friend of his, and a former Director (now a member of the Advisory Committee) of the Badische Anilin und Soda Fabrik of Ludwigshafen—a request that the Sub-Committee might be permitted to visit that establishment. The Directors felt some difficulty in acceding to this request. They, however, deputed Dr. Ehrhardt, one of their chemists, to call upon them at Heidelberg with Dr. Glaser, in order to explain their position, and to give such information as he properly could in regard to the special subject of the inquiry. They accordingly had the advantage of a conversation with him and Dr. Glaser together, and from their notes of it they make the following extracts.

Dr. Ehrhardt felt great difficulty in offering an opinion as to the proportion of coal tar dyes, whether by way of value or of quantity, which require the use of alcohol in their manufacture, but was inclined to accept as probably correct an estimate which had been given to us in Berlin by a very competent authority, and which placed the proportion at 10 per cent. of the whole. He observed that indigo and alizarine, neither of which requires the use of alcohol, would account for at least one-half of the production of the Badische Fabrik. In addition there was the large class of azo colours, which made up a large proportion of the rest of the colouring matters made by the Company, and of which only a very few require alcohol. Asked whether, in these circumstances, it might not be possible to engage profitably in the manufacture of the 90 per cent. of dye-stuffs that need no alcohol, while neglecting those that required alcohol, Dr. Ehrhardt remarked that such an enterprise would be at a disadvantage as regards the bye-products, for the profitable utilization of which research demanding alcohol was necessary.

On the question of the proportion that the cost of alcohol bore to the total cost of production of coal tar colours, Dr. Ehrhardt felt unable to offer an opinion; but he regarded as quite possible an estimate of ½ per cent. which had been given to us in Berlin by the authority previously mentioned. Duty-free alcohol in a pure state is not allowed under any circumstances, not even in the laboratory. The denaturants employed by the Badische Fabrik are animal oil, pyridine, and sometimes the colour to be manufactured.

The importation into Germany of English-made colours of intermediate products is small, and is confined to a few specialities. The total number of persons employed in the Fabrik is between 7000 and 8000, of whom a large number are boys—no women. Of these only a very few could ever have access to the spirit used at a stage at which it might be drunk, and those few would always be under supervision. There is no particular tendency at the Fabrik to avoid the use of alcohol, the restrictions not being found seriously burdensome.

On the general question of the causes which have led to the great development of the coal tar industry in Germany, and its decline—or at any rate, its stagnation—in Great Britain, we had much interesting talk with Dr. Glaser and Dr. Ehrhardt, and also on the following day, at Mannheim, with Dr. Caro, who may be regarded as one of the principal founders of the industry in Germany. They all agreed that, as an historical fact, the question of alcohol had little or nothing to do with the matter. Dr. Caro pointed out that the movement had begun, and had reached a point of considerable advancement, before the time at which the use of alcohol otherwise than as a solvent—a purpose for which methylated spirit is perfectly suitable—had been appreciably developed, and before the time at which reduction in the selling-price of dye-stuffs through competition had rendered economy in production of serious importance. They were unanimously of opinion that the real cause of the failure of the dye industry to develop in the United Kingdom was the lack of appreciation by British manufacturers of the importance of the scientific side of the industry. Thirty and forty years ago the whole business was conducted by the manufacturer, without much thought of its scientific aspects, and without any adequate recognition of the place of the trained chemist in connection with it. In Germany the case was different. There, the rise of the industry coincided with an immense development of activity in the study of organic chemistry and in its application to industry, stimulated largely by the influence of Kekulé and his coadjutors and immediate followers. Dr. Glaser gave it as his opinion that Kekulé's conception of the chemical structure of benzol was the germ out of which has grown the modern colour industry. The output of chemists by the German Universities was relatively enormous, and has continued to be so for the past forty years, and the services of competent chemists became obtainable at salaries of no more than £100 per annum. Consequently, they were engaged by hundreds to act practically as foremen in the works, and the whole of the subordinate supervision was in the hands of scientifically trained men. This was of immense advantage to the business of manufacture, and at the same time it provided a large field from which to select the more competent men for the work of research and invention; and those thus advanced were given a leading part in the management and in the profits of the business.

Nothing of the kind was possible in England at that time; and perhaps it is not so even now. At the same time, these gentlemen all recognized that, as things are at the present day, when alcohol enters so largely into the composition of colouring matters, and when the profits on the manufacture of coal tar dyes and intermediate products have been cut down by competition to a narrow margin, the question of alcohol—of the price at which it can be procured, and of the facilities given for its employment—has become a matter of great, if not of cardinal, importance.

VISIT OF SCOTTISH JUNIORS TO THE PROVAN GAS-WORKS.

The Scottish Junior Gas Association, Eastern District, last Saturday paid a visit to the Provan Gas-Works of the Glasgow Corporation. The party, to the number of about a hundred, were met at the station by Mr. J. Lowe, the President, and Mr. W. M. Mason, the Secretary, of the Western District. At the works the members were divided into five parties—led respectively by Mr. J. Webster, the Manager of the works, Mr. J. Fraser, the Under Manager, Mr. J. M'Leod, the Chemist, Mr. S. Fleming, the Foreman, and Mr. J. Webster, the Carbonizing Foreman—and proceeded to make the round on the lines followed by previous bodies of visitors. Among the objects of special interest were the Parsons turbo gas-exhauster, which was shown working at a speed of 6000 revolutions per minute, the coal tipping and conveying plant, the outside gas-producers, and the coke-handling plant. There were countless other points of interest to different sections of the visitors, in the works, which need not be enumerated. At the close of the inspection, which lasted over two hours, the company were entertained to tea in the workmen's mess-room—Mr. Lowe presiding.

Mr. A. Masterton, the President of the Eastern District, said he had the pleasing and onerous duty to perform of proposing votes of thanks to those who had contributed to their afternoon's entertainment. They were indebted to so many friends that he had decided to unify them, and make one speech include all. First, they were extremely grateful to the Glasgow Gas Committee for granting them permission to inspect these works—a privilege, he need scarcely say, they highly appreciated. Secondly, they had been specially favoured by their genial and kind friend, Mr. Alex. Wilson, the Gas Engineer to the Corporation, who had been the acting medium on their behalf. Thirdly, and not the least in worth, they owed a debt of gratitude to Mr. Lowe, the Assistant-Manager of the Gas Department, and President of the Western District Association, and also to Mr. Webster, the Station Manager at Provan, and to the other officials who had conducted them through the magnificent works. Unfortunately, the originator and designer of the works, the late Mr. William Foulis, did not live to see their completion; but his mantle had fallen on most capable shoulders, in the person of Mr. Wilson, who took up the work enthusiastically, and, in his usual energetic way, brought the undertaking to the perfect state in which they now saw it. He was sure they could not but have admired this wonderful engineering achievement, remarkable in many ways; and they earnestly trusted that the future of the works would be unqualified success and prosperity, and that they would stand as a lasting memorial of skill, energy, and perseverance.

Mr. Lowe, on behalf of the Gas Committee and of the General Manager, Mr. Wilson, acknowledged the vote of thanks. He said they were always glad to have people coming round, as it gave them the opportunity of showing what they were doing. They welcomed not only those in the gas manufacturing line, but outsiders—such as consumers of gas—because in this way they could help to dissipate a great many erroneous impressions which these people were very apt to form regarding gas manufacture. He thought that, perhaps, one of the chief directions in which progress was required was in cheapness; and possibly some of them might have carried away something from the works which would give them a suggestion as to what might be useful in lowering the cost of manufacture. It seemed to him that if they had a cheaper gas, they would have an immensely greater field of supply. There was nothing but the price which kept them out of the domestic fire, as well as a number of industrial purposes; so that probably in the future very much greater development might be made in gas manufacture. He congratulated Mr. Masterton on the excellent turn-out which the Eastern Section had made.

Mr. J. Webster, in returning thanks on behalf of the staff and himself, said he had an idea that one or two Saturdays in the year should be set aside for ratepayers going through the works, and seeing the conditions of labour in them. It would educate the people to a higher understanding of what gas really was, how it was manufactured, and what it could be used for. This was done in some of the large towns in England; but he had never heard of it in Scotland.

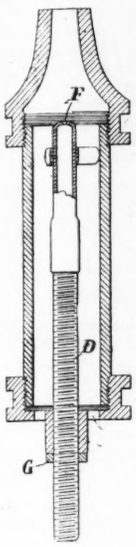
Mr. John Morris, the senior partner in the firm of Messrs. Ashurst, Morris, Crisp, and Co., solicitors, and a Director of several foreign water undertakings, who died on the 22nd of March, left estate of the gross value of £392,402, with net personalty £290,885.

On the recommendation of the Gas Committee, the Halifax Town Council have, by a large majority, increased the salary of Mr. John Wilkinson, the Engineer, from £500 to £600 a year. Six months ago, when a similar proposal was before the Council, it was referred back to the Committee for reconsideration. Members of the Committee, in again supporting it, submitted figures showing that, with a decreased consumption of coal, Mr. Wilkinson had obtained a substantial increase in the yield of gas. In this way, it was claimed, he had effected a saving for the ratepayers of quite £5000 per annum.

REGISTER OF PATENTS.

Gas Heating-Burners.—Onslow, A. W., of Woolwich Arsenal. No. 24,064; Nov. 7, 1904.

According to this invention, high-pressure illuminating coal gas, water gas, or producer gas is supplied to a pipe extending through the end cap of a burner-tube provided with inlets for the aspiration of the necessary quantity of air. The inner end of the high-pressure gas-tube opens some distance from the end of the burner-tube, and is screw-threaded at the portion passing through the air-inlet cap, which is so flanged and screwed upon the end of the burner-tube that the position of the gas-tube within the burner-tube can be adjusted until the proper relative positions of the gas-nozzle and the burner-nozzle are obtained.



To one end of the burner-tube is fitted a nozzle, and on the other end is a cap formed with a number of air-admission holes. The centre gas-tube D is screw-threaded at the portion which passes through a hole in the centre of the end cap. By turning the tube within the cap, the position of the nozzle or outlet F of the tube can be adjusted with respect to the nozzle; the tube being locked in position after adjustment by the lock-nut G.

The gas employed is high-pressure illuminating coal gas, water gas, or producer gas, flowing through the tube D, from the inner end of which it issues through F, whence it passes into the nozzle, drawing in the necessary quantity of air through the holes in the end cap.

One form of nozzle illustrated has a pin extending across the outlet opening at one side, so as to split up the gas and air mixture as it issues from the nozzle. The patentee says he has found that by the addition of this pin he is enabled to use the burner with gas the pressure of which varies within larger limits than is possible with burners unprovided with the pin.

Weaving the Mantle Fabric of Incandescent Gas-Burners.—Thomas, G., of Paris. No. 7264; March 26, 1904.

This invention relates to the production of "mantles" so as to allow them to hold a greater quantity of the rare earth liquid than heretofore, and, consequently, to possess when in use "an increased illuminating power, at the same time that they possess very great solidity." The characteristic feature of the process consists in weaving the tube with threads of any suitable material crossed together in such a manner as to form raised designs and giving to the designs points or projections in relief, which are more closely woven than the ground of the fabric. For example, the fabric may have a woven ground forming a gauze, and a continuous circular pattern forming a raised pattern thereon; the whole forming a network of fibres the solidity of which is assured by numerous crossing points. Moreover, the crossing of the coarse twisting thread on the two warp threads which carry it, oblige the latter to be drawn together so as to form openings similar to knitting meshes, which in the "mantle" when in use "increase the current of air, and consequently the illuminating power." The fineness of the ground is said to facilitate the lighting; "the fine threads becoming instantaneously incandescent communicate their heat to the coarser threads, and the lighting is effected without any shock or explosion."

Rotating Gas Washer-Scrubbers.—Smith-Rewse, H. S., of Darlington. No. 27,158; Dec. 13, 1904.

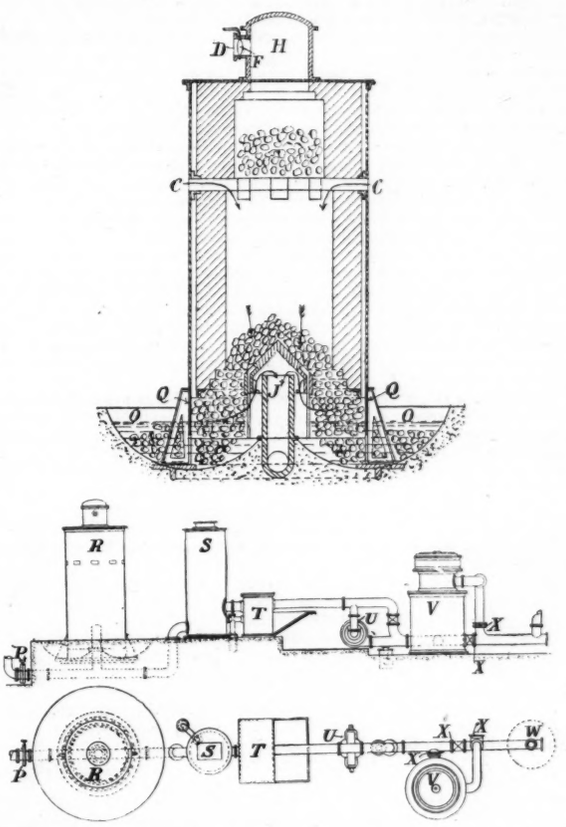
This invention relates to washer-scrubbers with wheel-like devices revolving in tanks (so as to retain them in a wetted condition); and the object aimed at is to prevent liability to breakage or fracture of the shaft on which they are mounted, and so obviate, as far as possible, the stoppage of the apparatus for effecting repairs. To this end, the invention consists in dividing the shaft into two sections and in arranging the operating mechanism between the shafts.

A, A^1 are the chambers or bays in which the wheel washer-scrubber devices are mounted upon the shafts B, B^1; a space being formed between the two pairs of bays in which the driving mechanism C is arranged. The two shafts are connected to this driving mechanism, which consists of a series of gear-wheels, into the boss D of one of which the adjacent ends of the two shafts are inserted so that the boss forms a coupling-box. Motion may be imparted to the driving mechanism either directly by an engine or through the medium of a driving belt or other suitable connection.

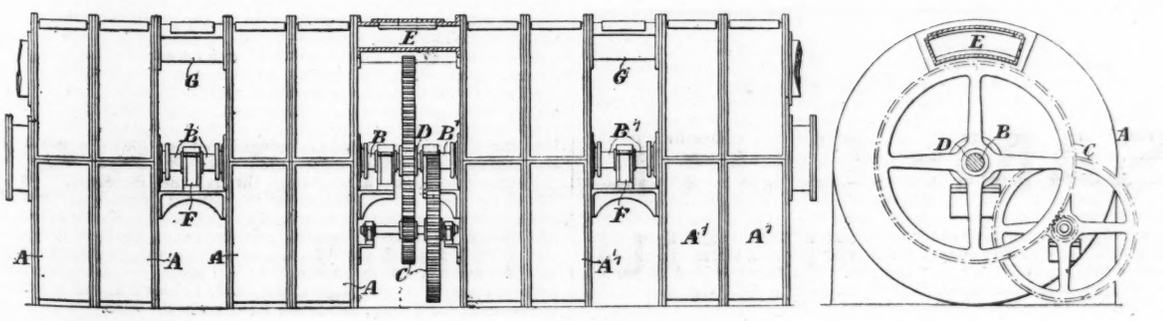
The bays A are connected by a passage E to the bays A^1, so as to bermit of the free flow of the gas through the apparatus. The chambers of each pair are represented as being arranged with a bearing F petween them for the shaft, and as being connected by a passage G. They may, however, be arranged close together in the usual manner.

Generating Combustible Gas from Hydrocarbonaceous and other Solid Fuel.—Thwaite, B. H., of Great George Street, S.W. No. 7347; March 28, 1904.

The process constituting a feature of this invention consists in maintaining a column of solid fuel in a state of graduated and inverted combustion—that is to say, the combustion is initiated at the upper level of the fuel by the introduction of certain proportions of air sufficient to evolve the more volatile of the hydrocarbons; and by a secondary admission of air, some distance below the upper surface or level of the fuel, a further and higher state of fuel combustion is effected, by which the temperature of the fuel is maintained in a comparatively high degree of incandescence. The direction of combustion in both zones of limited oxidation is downward; the air being either introduced into the generator by pressure or by aspiration applied to an escape flue constructed at the base of the column of fuel, and in such a way that the volatile gases before they can escape are compelled to flow towards the centre of the mass of fuel at its base.



The object of the limited duplex air supply, and which establishes two zones of combustion (one low temperature and one high temperature), is as follows: If the fuel introduced into the generator contains moisture, whether sensible or chemically combined, or contains dense hydrocarbons that are liable to recondense after being volatilized into tar, &c., the moisture is evaporated in the upper and initial zone of combustion, and so are the hydrocarbons. Both products are compelled to flow downwards into and through the secondary and high-temperature zone of combustion; and in doing so the hydrocarbon vapours are rendered more or less permanent, and the evaporated moisture is dissociated—the hydrogen being set free, and the oxygen



combining with the carbon so as to form carbon monoxide. Besides this chemical action, the gases are partially scrubbed in their passage through the incandescent fuel.

The generator embodying the essential features of the invention consists of a cupola form of vessel, the outer shell, of steel or iron, internally lined with refractory material. At (say) two-thirds of the height of the fuel-containing portion of the vessel there is a ring of distributed secondary air supply inlets C that permit air to enter into the fuel. The primary air supply D is arranged on the side of the charging hopper H. At the base and in the centre of the generator is the gas-outlet escape equipment J, constituted of a central gas-pipe having a conical head-piece of steel, carried by a bracket, from which suspend or hang in a circle the vertical bars, the object of which is to keep the outlet unobstructed. The lower ends of the bars dip into water in the hydraulic bath O, and are thus maintained cool.

To facilitate the starting of the gasification process, the air-inlet valve P is opened so that air can enter into the fuel at the base. By merely keeping the charging door open, a vertical draught is established, and the fuel is rapidly raised to a condition of incandescence. When this temperature is attained the valve P is closed, and the suction effect of the hand-started fan draws the air downwards through the incandescent fuel, and generates gas by suction effect; the air entering the vessel by the primary and secondary inlets.

The ashes and clinker are drawn from the bottom of the hydraulic bath without involving the escape of the gas, because a circular dip plate or apron Q prevents it.

The steam generated by the water escapes along with the combustible gas; and "its effect by condensation in passing through a coke scrubber assists in the separation of the tarry particles."

The sequence of the elements of purification employed is preferably as follows: R is the generator; S is the coke tower scrubber; T is the hydraulic washer; and U is the centrifugal fan suction apparatus, which can be driven from the main engine or by an electric motor. The gas is drawn from the base of the generator by the effect of the suction apparatus; the air being sucked into the gas-generating apparatus through the primary and secondary air inlets—being proportioned by the regulation of the areas to the degree required. The gas is drawn either directly through the tower scrubber, and then through the hydraulic washer, or else the sequence may be reversed—the gas being first sucked through the hydraulic box washer and then through the coke scrubber. The gas having been aspired through S and T by the fan is then forced by plenum effect through the final purifying apparatus V, which consists of a secondary filtration apparatus in which is slag wool, wood shavings, or wood wool, or sawdust. On leaving this secondary filter, the gas is forced into a pressure governor holder W, the object of which is to establish a uniform pressure supply to the engine. The bye-pass pipe and valves X permit the gas to be forced direct into the governor holder during the period of charging the exhausted filtration material in the filter V.

The rise and fall of the pressure governor holder is utilized to regulate the suction effect on the generator, as when the holder has risen to a certain height, a wire attached to a valve permits the gas to escape back to the inlet of the exhauster.

APPLICATIONS FOR LETTERS PATENT.

8671.—MARTIN, J., "Motor wheel motive power—steam, gas, water, and petroleum." April 25.
8698.—SHAW, E. J., "Inverted burners." April 25.
8730.—STAPFT, T., "Gas-generators." April 25.
8734.—FRANCIS, A. S., "Inverted lamps." April 25.
8759.—MAUTZ, A., "Electric distant gas-lighting device." April 26.
8788.—WILSON, L., "Gas-producers." April 26.
8796.—LAKE, H. H., "Gas-engines." A communication from the American Rotary Engine Company." April 26.
8824.—HOLMAN, W. J., "Incandescent burners." April 26.
8831.—STODOLA, A., "Gas-turbines." April 26.
8832.—FOSTER, H., "Production of gas." April 26.
8861.—MÜCKE, G., "Burning-off inverted mantles." April 27.
8867.—BIRCH, W., "Gas-brackets." April 27.
8901.—THEUERKORN, O. P., "Self-lighting gas-burner." April 27.
8918.—GENTY, L., and the SOCIÉTÉ DES ETABLISSEMENTS DE L'HORME ET DE LA BUIRE., "Gas-producers." April 27.
8928.—HEMINGWAY, H. W., and BOOTH, R., "Washing or purifying gas." April 27.
8929.—BLISS, W. L., "Train lighting systems." April 27.
8976.—GRANT, C. J., and MICHELL, A. G. M., "Measuring water." April 28.
9000-1.—VRIESLAND, A. I. VAN, "Mantles." April 28.
9020.—KENDRICK, A. L., "Gas-cookers." April 29.
9031.—YATES, W., and DAVIS, E. B., "Incandescent burners." April 29.
9038.—HELPS, G., "Mantle supports." April 29.
9065.—BLEZINGER, A., "Gas-producers." April 29.

Sale of Shares.—By order of the Directors, Mr. F. G. P. Neve (of Messrs. Neve and Son) offered for sale by auction, last Tuesday, £2000 of new "E" stock of the Tonbridge Gas Company. The stock (which will rank for dividend the same as the existing "B," "D," and "E" stocks, now entitled to 9 per cent.) was divided into 45 lots, 5 of £100, 20 of £50, and £20 of £25. There was keen competition for the stock, and the prices realized ranged from £184 to £190 per £100.

Gas-Meter Testing in Middlesex.—According to a report presented to the Middlesex County Council on Thursday, 86,495 gas-meters were tested during the twelve months ended the 31st of March. Of the total, 84,150 were received from makers, and 3144 of them were rejected. There were 2345 sent in from gas companies and others; and of these 1762 did not pass the test. The fees received amounted to £2590; while the expenditure in connection with the station was £1253.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Institution of Gas Engineers and Gas-Testing.

SIR,—Mr. Irving, in his letter in your last issue, I notice inserts the word "Council" of the Institution of Gas Engineers, whose actions in relation to their own decisions I have in no way questioned.

What I take exception to in Mr. Irving's letter in your issue of the 4th ult., is his statement "that the Institution of Gas Engineers should follow up their recent action in memorializing the Board of Trade," &c.

I submit that the Institution of Gas Engineers have never decided upon any such course of action. What the Institution did do in this matter, as the President well knows, was irregular and out of order; and, as a member, I object to this memorial being improperly put forward in the name of the Institution.

Had Mr. Irving confined his remarks, at the outset, to the action of the Council, nothing would have been heard from me.

Widnes, May 6, 1905. ISAAC CARR.

From Non-Statutory to Statutory Condition.

SIR,—I must first thank you on behalf of the Felixstowe Gaslight Company for the publicity which you have given, in your issue of May 2, to the claim made by the Commissioners of Inland Revenue for conveyance duty on the value of the property of a limited liability company when that company become incorporated by Act of Parliament. We are also greatly indebted to Mr. F. E. Cooper, in his capacity of Secretary to the Gas Companies' Protection Association for the advice he has given, and the information he has willingly placed at our disposal. I would, however, suggest that the Committee of the Association should thoroughly consider the advisability of taking some action in the matter, and thus justify their name "Protection" to those subscribers who are now affected by what is considered to be an extraordinary claim from Somerset House.

The Felixstowe Gaslight Company was incorporated by Act of Parliament in 1904; and when the time approached for the payment of stamp duty, I found upon inquiry that the Commissioners of Inland Revenue made claim as follows:—

(1) Capital duty at the rate of 5s. per cent. upon the whole of the nominal capital of the Company—not, as we expected, on the additional capital authorized by the Act.
(2) Conveyance duty at the rate of 10s. per cent. on the value of the property, which, they contend, was transferred from the Felixstowe Gaslight Company, Limited, to the Felixstowe Gaslight Company—the Act being the transfer deed.

The Commissioners of Inland Revenue refer in their claim to sec. 12 of the Finance Act, 1895 (58 Vict., c. 16); but we contend that the words "by way of sale" which this section contains are not applicable to the case under consideration, nor, in our opinion, does the decision in such a case as *Foster and Sons, Limited, v. Commissioners of Inland Revenue* show their claim to be good. You have, however, so plainly and fairly stated both views of the matter in your article, that I think it will be sufficient for me to put in as few words as possible what has been done, and what is being done, with a view of submitting a test-case to the Courts.

We, as you state, have had very little encouragement to proceed in the matter; and we know that to enter into litigation with the Inland Revenue would be a very serious matter for one small Company to undertake. If, however, all the Companies affected would agree to share the costs *pro ratâ*, it would be a totally different matter. But unless my last communication addressed to nine other Companies produces better results than those received from previous letters, I am afraid the only course we can adopt is to pay and look as pleasant as possible under the circumstances, though there is still perhaps a chance that an appeal to combine, from the columns of your paper, or from what I consider the proper source—"The Gas Companies' Protection Association"—may be productive of some good result.

My Directors having obtained the opinion of the Company's Parliamentary Agents and Solicitor (both of whom consider that there is no justification for the claim), then approached the Gas Companies' Protection Association, who replied that the matter had been before them, and that they had obtained the opinion of Counsel, acting upon which opinion several small companies had paid the amount claimed, not feeling disposed to go to the expense of having a case stated. But it was suggested that it might be worth while the Felixstowe Gaslight Company incurring the expense of contesting the matter.

The Secretary of the Gas Companies' Protection Association suggested in an interview at a later date that we should communicate with the other Companies affected, and invite them to join us in an action, the costs to be divided in proportion to the nominal capital of each Company. This was considered by my Directors to be the best course to adopt; and I communicated with (as stated) nine other Companies, all of whom are seeking parliamentary powers this session, with the result that all agree that the claim is unjust, but, with the exception of perhaps two, "discretion" was evidently considered "the better part of valour." As one put it, "to fight the tax-gatherers is rather a tall order." Others thought that the difficulty might present itself as to who should have the conduct of the case.

We were fortunate at this time, through the interest taken in the matter by one of my Directors, and through him a prominent member of Parliament, to obtain the views of a high official at Somerset House; and though perhaps not favourable to our cause, we have decided, if the other Companies will join us, to petition the Commissioners of Inland Revenue, asking whether they will agree to a case being stated for the opinion of the High Court, and, in the event of a decision in favour of the Crown, not to ask for costs in the case.

This has been communicated to the nine Companies; and so far I have received replies the gist of which are as follows:—

(1) The Directors are willing you should use our name as supporters of the application to the Commissioners, assuming there will be no expense.
(2) Upon consideration, I cannot advise my Directors to unite with you in the application to which your letter refers.
(3) In my opinion, the first step to be taken is to obtain the opinion of Counsel well versed in stamp-law.
(4) Do you wish my Company to join you in any expense, or merely in addressing a letter to the Inland Revenue Department?
(5) My Directors consider any action on their part would be premature, as we have not yet obtained statutory powers, and have had no demand from the Inland Revenue.

I make no further remark, except that the result is so far very discouraging.

F. PATERNOSTER, Engineer and Secretary.

Gas Offices, Felixstowe, May 5, 1905.

SIR,—Referring to the article in your issue of the 2nd inst., concerning *ad valorem* conveyance duty, if the Gas Companies Protection Association will arrange to carry through a test-case as suggested, the non-statutory gas undertakings with which I am connected will contribute £25 towards the cost, provided that from other sources a sum is assured which the Association deem sufficient to obtain a decision in the House of Lords.

Considering that *ad valorem* conveyance duty has to be paid when incorporating the non-statutory company, it seems inequitable that it should be paid again when obtaining statutory powers.

R. BRUCE ANDERSON.

5, *Westminster Chambers, S.W.*,
May 4, 1905.

Street-Lamp Tests by the National Physical Laboratory.

SIR,—Your criticism of the account I sent of street photometrical tests in Teddington requires a few remarks in reply, in order to allay some misapprehension to which your notes may give rise.

You mention that apparently precautions were not taken to select the lamps or adjust the burners to the quality of the gas. This was not done by us, because we were merely asked to measure the illumination in certain streets under normal working conditions, such as obtain when lamps are tested with the ordinary amount of care which they should receive in practice. I trust the fact that the Teddington District Council did not require us to select or adjust the lamps sufficiently explains why such low illuminations as were obtained from gas-lamp No. 1 on June 16 or the Nernst lamp No. 2 on June 13 were included in the average results given.

You mention that figures are not given to show the falling off in candle power with distance of the Nernst vertical filament lamp. The diminution in illumination at 20 feet distance with this lamp was 3 per cent. more than in the case of the gas mantles, as compared with 5 per cent. for the "Luna" lamps. We regret that the tests did not necessitate measuring the power consumption of the various lamps, so that we could furnish you with all the data you wish.

As regards the question of the greater constancy of the electric lamps, I did not say in my article that they were more uniform, but merely that they showed greater constancy. I think the difference is clear.

CLIFFORD C. PATERSON, Assoc.M.Inst C.E.

National Physical Laboratory, May 5, 1905.

The Mechanical Handling of Material.

SIR,—In the "JOURNAL," p. 284, there is a review of a volume on the above subject.

I know Mr. Zimmer well, and have none but kindly feelings towards him; but I must say his profuse descriptions of German conveying and elevating plants, and his almost entire lack of reference to British installations of much earlier date—especially in gas-works—only go to show that now, as when he came over from Germany, over twenty years ago, he still retains his national prejudices about the superiority of German over British engineering.

Your reviewer of the volume, in one of the last sentences, remarks: "It is a technical scrapbook, with the best scraps left out"—a neat and apt definition of the book. I do not wish to be thought a "scrap" in the conveying and elevating business, but as responsible for hundreds of installations, along with my friends, Drake, Broadhead, Graham, &c., some space might have been spared in the volume—even at the expense of leaving out a lot of the German matter—to admit of fair and gracious reference to the work of the British engineers.

Your reviewer, in his opening sentences, observes: "The developments of labour-saving machinery in gas-works, of coal and coke handling plant, have been faithfully recorded in the "JOURNAL;" and he adds: "A patient collector of such articles could not but succeed in writing from them a comprehensive treatise." The "JOURNAL," I believe, contained the first article ever printed on the automatic conveying and elevating of coal; also the first article on the automatic handling of coke. The former was read by me at the meeting of the North British Association of Gas Managers more than fourteen years ago, at Perth; the latter at a meeting of the same Association held at Glasgow a few years after. I certainly do not think it would be possible for a "patient collector" to produce a treatise on the subject equal to a reprint from the "JOURNAL" of all the articles you have, as you justly claim, so faithfully recorded since I read the first paper on coal-conveying plant in July, 1890.

I hope Mr. Bower, of West Hartlepool, will again—as he did years ago in the "JOURNAL"—show that he was the first gas engineer to use a hot-coke conveyor.

GILBERT LITTLE.

Smethwick, May 6, 1905.

Spencer's Vertical Hurdle Grid.

SIR,—Referring to the letter of Messrs. Samuel Cutler and Sons, dated the 19th ult., and published in your issue of the 25th ult., allow me to state, in reply, that I am advised by Counsel that this grid is (*a*) not an infringement of the patents they hold in connection with the Jäger system; and (*b*) that their patent (which was applied for in September, 1902) was anticipated by an open publication of the system in May, 1902. My Solicitors have undertaken to accept service of process on my behalf if Messrs. Cutler institute proceedings.

WALTER SPENCER.

Elland, May 3, 1905.

Gas Companies' Secretaries and the Chartered Institute.

In the "JOURNAL" for the 25th ult., reference was made to the election of a gas secretary as a member of the Chartered Institute of Secretaries. A correspondent writes to point out that the last published year-book shows that from 50 to 60 gas men are members of the Institute, either as fellows or associates. The Charter was granted on Nov. 4, 1902; and until the corresponding date this year, it is allowable for secretaries of experience to be elected fellows without examination. Those, therefore, who would wish to join are advised to write to the Secretary, No. 65, London Wall, E.C. Our correspondent says that secretaries of some of the foremost gas companies are members.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Lords Bills read a second time and committed: East Cowes Gas Bill, Truro Water Bill.
Lords Bill reported, with amendments: Hessle Gas Bill.
Bills read the third time and passed: Andover Lighting and Power Bill, Aylesbury Gas Bill, Colne Corporation Bill, Croydon Corporation Bill, Halifax Corporation Bill, South Oxfordshire Water and Gas Bill, Stockport Corporation Bill, Swansea Corporation Bill.

The Skegness Water Bill has been referred to a Select Committee, consisting of Sir John Brunner (Chairman), Sir Lewis Molesworth, Colonel Lucas, and Mr. C. Allen; to meet on Thursday.

HESSLE GAS BILL.

Discounts and the Prepayment Meter Clauses.

At a sitting of the Committee on Unopposed Bills last Thursday—Mr. J. W. LOWTHER in the chair—consideration was given to the Hessle Gas Bill.

Sir CHANDOS LEIGH (a member of the Committee) said that by clause 71 the promoters were to be authorized to allow discounts or rebates of 10 per cent. for prompt payment and of 20 per cent. to large consumers; and he pointed out that in the report of the Local Government Board on the Bill, attention was called to the large discounts proposed to be allowed. He said the clause was a departure from the model clause of the House of Lords, under which the discounts allowed were 10 per cent. for prompt payment and 15 per cent. in the case of large consumers. This clause had been settled after some discussion with Lord Balfour of Burleigh; but this year, in the Croydon and in one or two other Bills, nothing had been allowed for prompt payment, while in the case of large consumers 20 per cent. was allowed. In this Bill there was a further variation.

Mr. A. V. FRERE (the Parliamentary Agent for the Bill), in reply to the Chairman, said there were no special circumstances in this case. He added that in the Corbridge Gas Bill last year 15 per cent. was allowed for prompt payment, and no limit was fixed in regard to large consumers. So long as all consumers were dealt with alike, he did not see why there should be a limit. The point was that all should be treated on an equality; and if the Company could grant a large concession, what did it matter to anybody?

Further discussion having taken place, the clause was inserted.

Sir CHANDOS LEIGH informed the Committee that in the report of the Local Government Board it was stated that there was no prepayment meter clause in the Bill.

Mr. FRERE said a clause, almost identical with that in the Chippenham Act of last year, had now been inserted to meet this point. In the present Bill, power was sought to charge 10d. extra per 1000 cubic feet where they supplied the fittings, but without a cooker; whereas in the case of Chippenham the figure was 1s., for which the Company were bound to supply a cooker. The alteration was made as it was not fair to charge the extra 2d. to those who did not take a cooker.

Sir CHANDOS LEIGH said the charge of 10d. as proposed had been passed many times. What he wished to have explained was the proposal to charge 8d. extra for a meter without fittings.

Mr. W. H. THRALE, the Secretary and Manager of the Company, said the charge of 8d. extra was received very satisfactorily at present. The Company could not include a cooker in this figure. He did not think that if the charge were reduced to 6d. it would lead to increased business. The prepayment meter, at 8d. extra, was very popular.

Sir CHANDOS LEIGH observed that some latitude should be allowed in country districts; but the grant of 8d. must not be taken as a precedent.

The clause was then allowed.

Formal proof of the preamble having been furnished, the Bill was ordered to be reported.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

Ninth Day.—Wednesday, May 3.

(*Before Mr. Justice* GRANTHAM.)

Graham, Morton, and Co., Limited v. Compagnie L'Union des Gaz.
The Milan Gas-Works Contract.

The hearing of this important case, which was adjourned on the rising of the Court for the Easter vacation (*ante*, p. 242), was resumed to-day.

Mr. RUFUS ISAACS, K.C., Mr. J. A. SIMON, and Mr. A. M. PADDON (instructed by Messrs. Spyer and Sons) appeared for the plaintiffs; Mr. J. A. HAMILTON, K.C., and Mr. A. H. SPOKES (instructed by Messrs. Waterhouse and Co.) represented the defendants.

FURTHER CROSS-EXAMINATION OF M. FREYSS.

The first questions put to witness (whose cross-examination, as before, was conducted through an interpreter) by Mr. ISAACS had reference to the quality of the material used by the plaintiffs. Counsel asked M. Freyss whether, except for the refractory portion, the materials used were good; and he replied that the refractory materials used were good, but that those which formed the walls around the retorts were made of pure silica. This did not necessarily mean that the materials were bad, but that the silica ought not to have been used in particular places. His complaint in regard to the material *quâ* material was that the red bricks melted at a temperature far too low. The reason for the demolition of the installation was that some of these bricks were not of good material.

Asked if this had always been his opinion, he said it was from the moment they began to demolish the beds. The red bricks should have been used in places where they were not touched by the heat. These were common ordinary bricks of good quality. As to whether it would be right to use pure silica bricks, that depended on the place in which they were employed, because pure silica expands very much with heat, and this might produce a disturbance in the ovens which ought not to take place. There was such a disturbance in the walls supporting the retorts; but he did not attach any essential importance to it. In No. 6 bed, they saw a retort which had changed its shape and become compressed; and this might cause it to crack. The Stettin benches had had certain repairs to the regenerators; but he did not know that the bricks used in the resetting were of the same quality, and were bought of the same people, as the bricks of which he complained. He had learned in the course of the case that the firm from whom these bricks were bought was named by Mr. Bourne.

Mr. ISAACS: Assuming that the materials were good, and that the ovens were properly worked, would you attribute the defects of which you have spoken to design?

Witness: Yes.

And, as I understand, the unequal distribution of the gases (the excessive heat at certain places which would cause fluxing) is the main thing of which you complain?—Yes.

Did you say that this is caused by the bad design of the settings?—The bad conception of the beds.

Suppose the design was good, but the management of the ovens was bad, and excessive heat was caused, would you not get exactly the same results?—You might get fluxing; but I would not say it would occur at the same places.

Do you mean that the bad working and management of the ovens could not have caused the fusion of which you speak?—Yes, in these places; and also in others.

Suppose the bad working had caused excessive heat, would not the effect be equally to cause fluxing?—Yes.

Equally, in that case, you would have had a bad distribution of gases?—No; but we should get excessive heat.

Tell me where there would have been fluxing if there had been improper working, causing excessive heat?—In the places where the carbon monoxide mixes with the secondary air.

Is not that exactly where you did find the fluxing?—In part only. By working badly, you might have found fluxing in the combustion chamber above each nostril.

Do you think bad working would not have given as much fluxing as you see in this photograph [produced]?—No.

Is it not a fact that if you liked you could cause fluxing of the best installation that was ever made by wrong working for 24 hours?—You might cause fluxing, but not so bad as this. I have never seen such fluxing anywhere.

Could you not do it in 48 hours if you worked with that object?—Evidently, if you worked for the purpose, you could burn up an oven.

Do you pledge yourself that if there had been bad working there would not have been this fluxing caused?—I cannot say yes or no.

Do you mean that you know nothing of the bad working or that it is impossible to answer?—It is difficult to say beforehand in what state you would find an oven if worked badly.

Assuming that the ovens had been badly worked for a long time, is not this the kind of fluxing you would expect to find?—I should not have expected to find so much fluxing as has taken place here.

But you would expect to find it here [indicating the place on the photograph]?—Yes; and in other places also.

M. DERVAL AND THE RECONSTRUCTED BENCHES.

In further cross-examination, witness was asked whether M. Derval (of the firm who reconstructed the settings) used the little dampers and the secondary air boxes and the front and side of the producers and regenerators in the reconstruction; and he said he did not recollect the dampers, but he thought they used these things. They formed part of the settings as constructed by Messrs. Graham, Morton, and Co. Derval would have preferred his own design; but he used them for economy, as they were there. They were passable; but, personally, he (witness) preferred Derval's design. He did not know that Derval had said they were "*bon modèle*"—good design.

At this point, Mr. Isaacs produced a letter in which Derval spoke of the designs of these things; but Mr. Hamilton objected to it. After some discussion, however, it was admitted by his Lordship.

Cross-examination resumed: He knew Derval.

Do you know that Derval in reconstructing the settings used the things referred to?—Yes; but he did not know he said they were of good design. Personally, he (witness) knew of more practical designs. He knew that Derval had arranged with the defendants that he was to use in the reconstruction all the blocks, tiles, and brickwork materials that plaintiffs left.

Mr. ISAACS: Have you ever had the control of the construction of inclined retorts?

Witness: No.

When you spoke of the control of the brickwork construction of the retort-settings, that was not of an inclined retort setting?—No; it was one of horizontal retorts, by Klönne, at Strasburg, and the Manager of the works was over me.

M. FREYSS'S VISIT TO MILAN.

Cross-examination continued: When he went to Milan in January, 1904, he was sent out for the purpose of inquiring into some question with regard to the shortage of coal. He had no instructions at the time of his departure to examine the retorts; but he received them during his stay in Milan, from Mr. Martin, now Secretary of the Company. They were limited at that time to the San Celso works; but they were extended later to all of them. The San Celso works included the Graham and the Stettin furnaces; and there were no special instructions with regard to the former. It was he (witness) who first discovered that the installations were unsatisfactory. He did this by personal examination at the time Mr. Bourne was still the Resident Engineer at Milan. At the end of his first visit, at the beginning of February, he came to the conclusion that one of the settings must be demolished; and he reported in writing to the Company.

A "PRIVILEGED" REPORT.

Mr. ISAACS said he must call for this report.

Mr. HAMILTON: It is a privileged document, and not produced. It was prepared in anticipation of this litigation, and is therefore not produced.

Mr. ISAACS: Well, I shall make my observations on it later. (To witness:) What tests did you make before you came to the conclusion that the settings must be demolished?

Witness: I made heating tests; and it was after these and other tests, such as verifying the temperature of the ovens, &c., that I concluded that the benches must be demolished.

M. FREYSS'S FUEL TESTS.

Cross-examination continued: It took eight or ten days to make the tests. He made notes of them at the time. The dates were the 3rd, 4th, and 5th of February. [Notes passed to Counsel.] These were fuel tests; there was not a single temperature noted upon them.

Mr. ISAACS [passing the notes up to his Lordship] said they related entirely to the fuel, and had nothing to do with the heats.

Cross-examination continued: The document, except certain figures, which were a reckoning of the mean figures, was given to him by an employee—M. Fumagalli—at the time they made the tests; and he thought he had had it in his possession ever since. He scratched out all the figures against Feb. 2 because there was a mistake in the number of the retorts of one bench, and he could not take an average with them. When he was taking the tests, it was of the Stettin as well as the Graham ovens, as he wanted to ascertain the amount of heating for both. The figures at the end of each furnace meant the quantity of coke which went into the gas-producers from the retorts; and the figure 58 at the end of one date meant 58 retorts completely charged with coal. These 58 retorts of coke were used for the purpose of heating all the retorts in the bench. He reckoned the charge of coal for the Graham retorts at 320 kilos, and for the Stettin retorts 220 kilos. The result was that from each 100 kilos of coal distilled they got 70 kilos. of coke. His calculations were based on the coal then employed, which was of medium or average quality. He had heard that there were complaints about the quality of the coal; but he could not give any explanation on the matter. He knew they were using Deans Primrose coal for carbonization; and, in his opinion, this was not a very inferior coal. There was evidently better. Deans Primrose might be less good than others, but that did not mean that it was bad. He had learnt that the low yield of gas per ton of coal was attributed by the defendant Company to the inferior kind they were using. He heard that Mr. Bourne complained of the bad coal; but he knew nothing of it personally.

Mr. ISAACS: There is a weekly report here, signed by you, in which you say: "The production of gas per ton of coal distilled is still unequal. This arises from the fact that the coal is not weighed; but this will be done as soon as the scales are established." You signed that report?

Witness: Yes.

Do you not know that in June, 1904, complaints were made about the quality of the coal?—Yes.

Was there not also a complaint that the coal was wet?—Yes.

Do you not know that the fact of carbonizing wet coal seriously affects the production of coke?—It makes a difference, no doubt.

I suppose you understand now that it is very important, in a system of inclined retorts, how you use the dampers. Now, when you made your tests, who regulated the dampers?—I did.

How did you know to what extent to open the registers?—The dampers ought to be open to give sufficient draught to draw the gases from the oven.

THE ORDER FOR THE DEMOLITION.

Cross-examination continued: The date of the report he made to the Company after the tests must have been at the beginning of February, immediately after them. He did not exactly advise the Company to demolish the furnaces. He thought it might be possible at that time to modify them so that they would work properly. It was only when they began to demolish the ovens that he saw their defects. That was in February or March. He demolished one setting and then proceeded with the others. At that time the only reports in favour of demolition were his own and one by Mr. Green, who was in Milan at the time. Mr. Green was not present during the original tests. It was through the Directors that the order to demolish came; and he thought that it was in writing. It was about the end of February or the beginning of March.

"PRIVILEGED" DOCUMENTS REFUSED.

Mr. ISAACS: I am bound to call for these documents, as privilege has been claimed for them all. (To witness:) What is the date of your report?

Mr. SPOKES said the report was made in contemplation of litigation, and privilege was claimed for it on good grounds.

Mr. ISAACS: I only want the date.

Mr. SPOKES: I think it is the 6th of February.

Mr. ISAACS (to witness): Do you know that on the 14th of February a tender was made by Derval for the resetting and transformation of the Graham furnaces? Had you reported that the inclined retorts should be transformed?

Witness: I thought, after my tests, that by enlarging the gas-producer we might make them do.

That was Bourne's gas-producer?—Yes.

Then the Directors, with no other report than yours, ordered the demolition of the furnaces?—I do not know. I sent in my report; but I do not know what conclusion the Directors drew from it.

When did they start demolishing the second bed?—In April, I think.

The minute-book of the Company was here produced, and handed to Mr. Isaacs, who called for the report of Mr. Green.

Mr. SPOKES said this was one of the documents for which privilege was claimed.

Mr. ISAACS remarked that this non-production of documents in the case was becoming a farce.

Justice GRANTHAM asked how a report of this date could possibly be privileged.

Mr. SPOKES: Because it was made in contemplation of litigation.

Mr. ISAACS submitted that he was entitled in law to have both of these reports.

Justice GRANTHAM: I think you ought to produce them.

Mr. SPOKES said he should not do so.

Mr. ISAACS remarked that in that case he should say they were not produced because, if they were, it would put his friends completely out of Court.

Justice GRANTHAM: Do you want me to commit Mr. Spokes for contempt?

Mr. ISAACS: No, my Lord; I will let my learned friend off that.

FURTHER QUESTIONS AS TO THE INSTALLATIONS.

In further cross-examination, witness was asked if, during his second visit to Milan, there was a question whether the inferior quality of the gas was due to the bad working or to the installation; and he replied that he thought the question must have been discussed. In May, 1904, it was quite clear, as they had demolished the second bench, and found there was a too great use of coke and unequal heating. There were difficulties as to the illuminating power of the gas, which were also due partly to the installation. He did communicate to Mr. Bourne the tests he made in 1904, because he could have seen them in the book in which the results of the working of the retorts were entered. He did not show Mr. Bourne his report, because he thought his duty was to send it to the Directors. He had not to consult Mr. Bourne. When he got to Milan he was on social terms with him. He found him a rather "close" man; and it was difficult to get anything out of him. He did not tell Mr. Bourne the effect of his report; nor did he know that Mr. Bourne had just before his visit said he was perfectly satisfied with the installation. Referring to witness's statement that the gas outlet was too low in the Graham furnaces, Counsel asked him if he knew that in the Stettin installation the outlet was equally low. He replied that he did, but said that it was for a special reason—it was a question of construction. Asked if he knew that installations with the outlet equally low were working well elsewhere, he said he had heard it stated in the course of the case. In such constructions, there would have to be clinkering many more times than was usual in gas-works—he should think perhaps every four hours, or at any rate at frequent intervals. He knew that one of the Milan benches was not demolished until October, 1904.

THE ORDER FOR DEMOLITION PRODUCED.

The order for demolition which Mr. Isaacs had asked for was then produced. It was contained in a telegram to Mr. Himing, authorizing as many of the old benches to be put in action as would "let down" Graham's. This was dated Feb. 9, 1904.

Mr. ISAACS: When this first bench was demolished, it had been working under Mr. Bourne's supervision for 420 days?

Witness: I believe so.

Tenth Day—Thursday, May 4.

FURTHER CROSS-EXAMINATION OF M. FREYSS.

On the resumption of the inquiry to-day,

M. *Freyss*, in further cross-examination by Mr. ISAACS, said that the great part of his complaint as to the brickwork was with regard to the filling-in. He did not suggest that putting the bricks on end instead of flat made it necessary to demolish the furnaces; nor did he say that this position of the bricks had the slightest effect on the functions of the installation. He complained that in some cases there was no mortar between the bricks, and in other cases too little. He thought there should be bonding in laying the bricks for filling-in; and it was desirable to leave room for expansion in certain places. He did not suggest that leaving some of the bricks for filling-in with too little mortar had the slightest effect on the working of the furnaces, but perhaps it had on their duration. One of the purposes of the filling-in was to give support to the structure. Asked if it was not right to say that the structure was properly supported in this case, witness said "Yes" and "No." In the triangle between the carbon monoxide duct and the masonry, the work was not sufficiently fireproof. If it had been, the fluxing which had taken place would not have occurred. At the time of the demolition, the superstructure had in great part been properly supported, notwithstanding the fluxing; but in the triangle he had mentioned, the masonry, having been fused, it was no longer able to support adequately. Apart from the fluxing, however, it was properly supported. In his view, with regard to the fluxing in the triangle, the masonry was not sufficient to support the ducts. If there was any important sagging in the structure, the retorts would suffer. If one wanted to alter the furnaces, the construction of the masonry in the furnace would not be seen in making the alterations; but the way in which a small part of the masonry had been done would be seen. When he changed the Graham furnace to the Bourne furnace, he only noticed the masonry just round the gas-producer; and he did not see anything to complain of. He had heard of cleaning the nostrils with rods; but had never seen the bar shown. The construction of the nostrils affected the working of the furnaces. Owing to it, they could be easily blocked.

Mr. ISAACS: Supposing the nostrils could be cleaned by means of the iron rods, and were properly cleaned, that defect in construction would not affect the proper working?

Witness: When once the nostrils were properly cleared, it would have no influence on the working.

How many nostrils were there in the installation?—About 1200, counting the air nostrils as well; and I saw the greater part of them in the demolition.

Was the blocking you saw caused by fusion?—There were two causes—fusion in great part, and filling-up with cinders and ashes.

Cross-examination continued: He took two tests in June; and at that time he knew there was a dispute going on, but did not know if there would be a lawsuit. The tests he made were more for himself than for any other reason. He told Mr. Marshall about them when he came to Milan. Afterwards, they made some tests together. Mr. Marshall had the general control of the works.

MORE PICTORIAL EVIDENCE.

At this point some photographs were handed to the witness.

Mr. ISAACS: Before you took these photographs, did you not put some black marks on the wall which showed out very black in the prints?

Witness: All I remember is that someone marked out the contour in white; but I have no remembrance and no knowledge of any black marking.

On being pressed by Counsel on this point, witness said he believed in one case black paint was put on one of the places before the photograph was taken, but that it was objected to by someone, and then no more was used.

Another photograph was then given to the witness.

Mr. ISAACS: Was there any black colour put on that photograph before it was taken?

Witness: I think so; but I cannot tell whether it was put on before or after the photograph was taken.

Mr. ISAACS: I say the black was put on before the photograph was taken, and then the copy which has been given to your Lordship was blackened; whereas the one we had is just as it was taken.

Mr. SPOKES remarked that this could not have been by design.

Mr. ISAACS: Well, I do not think we have been treated fairly in this matter. The photographs should not have been given us without an explanation.

Mr. SPOKES: It must have been the fault of the solicitor's clerk.

Further cross-examined, witness repeated that, to his knowledge, no black colour, except that which he had mentioned, was put on the walls before the photographs were taken. He thought the fact that three instead of two baffles had been placed in one of the furnaces had a bad effect on the working; but he could not say that there were any too many baffles in all the other furnaces, as it was very difficult to say what would be the construction after demolition.

REVELATIONS OF THE DEFENDANTS' MINUTE-BOOK.

The minute-book of the defendant Company being produced,

Mr. ISAACS said in one part he had unsealed in the book he found an important entry dated February 2. It was headed "Benches in Milan," and said: "Mr. Green attended the Committee and made a verbal communication on the subject. M. Derval was requested to submit a scheme and tenders for the improvement of the furnaces, &c., and the benches at San Celso, such scheme and tender to be for one block of retorts." Counsel remarked that this explained why it was only one bench was first pulled down. (To witness:) Before you went to Milan, did you know there was a scheme on foot for the improvement of the furnaces and benches at San Celso?

Witness: No.

Was there any plan prepared by you except that report of yours submitted to the Directors?—No.

Mr. ISAACS said he had now found another minute of the 9th of February, which said: "Read reports of Mr. Green and M. Freyss. Instructed Green to meet Freyss in Paris and arrange with Derval as to improvements and alteration of the Graham Morton benches." Then came this passage: "Milan coal deficit. Considered report signed by Martin and Freyss on the very unsatisfactory state of affairs at the Milan works, and resolved that the following disciplinary measures should be carried out by Mr. Jones on his approaching visit to Milan." Then were given the names of a number of persons, which he did not want to read out unless it was necessary, who were to be dismissed, retired, and reprimanded, and salaries reduced. They were all set out. Then Mr. Pesce was to be requested to report on the capabilities of the

carbonizing foreman, Fumagalli. It went on: "Granted M. Freyss's request to be allowed to return to Paris; the Committee desiring that he return as soon as possible to Milan." Then again: "Milan: reorganization of the technical staff." Then followed a series of references: "The Committee agreed to the following proposals, suggested by the Paris Directors, for the reorganization of the technical staff: That the duties of Mr. Pesce, who is to replace Mr. Bourne, be limited to the control of the San Celso works; that a capable Engineer be appointed as Assistant Manager to take charge of the technical services, and to whom the chiefs of the technical staff will have to present a report daily; that a suitable man be found to have control of all external works; that the coal and coke services be entirely revised, also the duties of the Engineers-in-Charge at each of the works; that the requisite sub-technical assistants be engaged as soon as possible; that M. Freyss return to Milan and remain there for two or three months and remedy defective benches;" &c. That was a portion of the minute-book which he had just unsealed.

Justice GRANTHAM said he thought the defendants ought not to have concealed this minute.

Mr. HAMILTON submitted that nothing at all wrong had been done. There had crept up from time to time in the case reference to an apparent deficit in the coal at Milan of some 16,000 tons; and the reference in question only related to the "clearing of the decks" of the people who were found responsible for the deficit. His Lordship would agree that this was not relevant to anything in the case.

RE-EXAMINATION OF M. FREYSS.

In re-examination by Mr. HAMILTON, witness said he carefully inspected the coal about to be used before his tests of Feb. 3, 4, and 5; and it was of good quality. A certain quantity was weighed when put into the retorts, and the coke weighed when coming out; and the difference between the figures gave the required result as to the quantity of coke used. The coal could be weighed in the trucks; and when the trucks were weighed afterwards, they knew the weight of the coal. So far as he was able, he did not neglect any means to prove that the results he had obtained by his tests were correct. He had made other tests to corroborate those of which he had given the figures.

Mr. HAMILTON: It was suggested to you that the fusing of the bricks, especially in the combustion chamber, proved bad handling by the workmen; and you were asked to assume that there had been bad handling. Now, what kind of bad handling would have been necessary to produce the existing results?

Witness: Very bad working indeed.

Further re-examined, witness said he did not think any bad working would have produced such a result as existed. If there had been such bad handling, it would have manifested itself to anyone who was watching the working. If the fusion was caused by bad working, he should have expected to find traces in other parts besides those where they were found, particularly where the carbon monoxide gas met the secondary air. What he found was, in his opinion, due to excessive draught in the passage, due to bad conception of design. He had seen the way in which the men did their work while he was making his tests, and he took care that the ovens were properly operated. His results were not at all prejudiced by bad working of the men; and he tried to eliminate this element, and thought he had been successful. He remembered a large piece of clinker had been spoken of as being found in the furnace. This would only affect the commercial result of the distillation; but it would have no bad effect on the settings or the installation itself. He did not think the old material was used in great proportion when Derval made the reconstruction of the furnaces, as most of it was broken up and rendered unfit to use again.

EVIDENCE OF MR. MARSHALL.

Mr. *F. D. Marshall* was the next witness. He said he first went to Milan in April, 1904, and found one bench (No. 7) already demolished. He superintended the demolition of benches Nos. 6, 5, and 4; M. Freyss being his deputy. He inspected the furnaces before demolition, and found they were working very badly. They were striped a great deal, which showed uneven heating [A coloured drawing was produced, showing the uneven heating of the various chambers.] The carbonizing of the coal was also very irregularly done; the coal being under-carbonized in the lower part and over-carbonized in the upper. When he was there, the charging was very irregular; and it was sometimes changed from every six hours to 10 or 12 hours—the reason being that it was impossible to get the gas out of the coal in the shorter period. In Messrs. Graham and Morton's system, the method of measuring the coal was called the "sure feed" or "shot pouch" method; and by it the charge was measured by volume only. This was a very unreliable system, particularly in the case of finely-divided coal. He had taken a number of temperatures in the ovens by means of a pyrometer, which gave the approximate temperatures by means of coloured glasses, through which the colour of the heat was taken, and they were found to vary from 840° to 1080°. He objected generally to the inverted funnel form of the Graham producer, because when the workmen pushed the coke into the producer it was difficult to fill it to the top, as it should be, and the tendency of the coke was to burn down in the form of a triangle; the result being to uncover the face of the outlet duct, which was a serious thing in such a furnace as the one in question. Had the producer been normal, it would have taken from four to five hours to uncover the duct; whereas as it was it burnt down in 1½ to 1¾ hours, perhaps 2 hours. As to quantity, a normal producer would take 413 kilos. of coke, which took 5 h. 25 m. to burn down and uncover the duct; while in Graham's producer 216 kilos. burned down in 1¼ hours and uncovered the duct. In each case he filled up each producer as full as it was possible, up to the charging-door. He also held that the distance from the grate-bar to the lip of the furnace in Graham's producers was much too shallow, being less than 2 feet; whereas the lowest as given by recognized authorities was 3 ft. 6 in. or thereabouts. He certainly thought the fuel bed should be more than 2 feet deep. If this was not so, some of the carbon monoxide gas would be burned up, instead of going up into the duct where it should go. With regard to clinkering, the shape of the Graham carbon monoxide chamber really encouraged the formation of clinker; and this was a great objection, as the clinkering was most arduous work, and men could not be kept on works where they had to clinker every few hours. In his opinion, Mr. Bourne obtained a better result by altering the furnaces, because he made the clinkering easier, increased the depth of the fuel bed, and enlarged the grate-bar area. They clinkered every 16 hours with the Graham furnace, and he was told every 48 hours with the altered Bourne furnaces. It was pointed out to witness that the plaintiffs said that all difficulty as to unequal distribution of the gas owing to the construction could be obviated by the regulation of the dampers; and he said he did not think it could, as all the dampers were made of tiles, and many of them were found stuck fast. He examined the dampers, and found that in every case the one behind the settings was pushed in 1¼ inches, and was stuck there. The damper in front was wide open, and had never been shifted since Graham and Morton left the job. He was told of this fact by others; but, in his opinion, the dampers were not at all satisfactory. He further complained that the plan produced by the plaintiffs was "faked," and did not show the use of common brickwork in a certain triangle. It was coloured yellow on plaintiffs' plan, as if it was fire-brick; whereas it was made of common stock bricks, and should have been coloured red as in his (witness's) plan.

Mr. ISAACS asked that the witness should be requested to confine himself to answers to questions, and drop "advocacy."

Witness then explained his objections to the making of the duct, which was only a few inches deep, whereas it ought to have been not less than 9, and preferably 14 inches.

Eleventh Day—Friday, May 5.

MR. MARSHALL'S INSPECTION OF THE SETTINGS.

Mr. *Marshall* was to-day further examined by Mr. SPOKES. He said that a number of analyses were made by M. Freyss, under his directions. During the demolition of the settings, witness went with a candle into oven No. 1 in bench No. 6. Having brushed away the scoriæ which had accumulated in the duct, he observed the horizontal duct, making a note that the uptake duct was very little fused. Then he observed that the part shown on the yellow triangle in the drawing was fused and had fallen down into a mass. This was composed of a medley of three descriptions of bricks. The covering of fire-brick was only 3 inches thick; and the whole thing had collapsed, blocking the horizontal channel. He followed the course of the channel up to the combustion chambers, as demolition had by this time been effected. His examination took place during demolition, and photographs were taken as the operation went on. Getting to the vertical duct, he found that the nostrils and the combustion chamber were completely fused; and a photograph was taken of this part. [Print produced and handed to his Lordship.] Wall 6 in the photograph was in the lower half of the chamber. The photograph clearly showed the intensity of the heat developed, as the highly refractory wall of silica brick had been fused at a very high temperature. Masses of melted material had fallen and choked the combustion chamber and nostrils. The division wall to the left of the centre retorts had sagged by the bricks giving way. There were other instances where the triangle gave way. In oven No. 6, it was completely melted; and the same thing took place in No. 7. These were all in the same bench. He thought this was in April, subsequent to Mr. Herring's visit to Milan. With regard to the ducts, he found them very little fused or glazed. In No. 4 oven they were slightly glazed; and there the triangle had again nearly melted. Oven No. 6 was clear, and No. 8 was glazed. In some of the ovens, the nostrils and combustion chambers were melted; while others were only partly so, and others again were clear. It was very important that nostrils should be easily accessible for cleaning; and the best shape was therefore a vertical one. But the design of Graham's nostrils showed that there would be an obtuse angle, or a slope from the arch, which would render it not easy to clean. In nearly every case the angle in the nostrils approached a right angle. [Witness produced a number of photographs in order to illustrate the defects alleged.] In some of the nostrils there was a corner which was nearly like a pocket. With such nostrils it was almost impossible to work properly; and no matter what kind of tool was devised for the purpose, they could not be effectually cleaned. In the lower half of the chamber the nostrils were not stopped up so much as in the upper part; but they were no more accessible than the others. Of course, the inaccessibility of the nostrils made it difficult to clean them at all; and, on account of their being partly choked, unequal heating resulted. The combustion chambers in the plaintiffs' plan were covered by a ceiling, which was unique in such works, and therefore holes were made in the walls to allow the gases to intermingle.

Mr. ISAACS objected to this point being gone into, as it was not raised in the pleadings, the particulars, or in the opening for the defence.

Justice GRANTHAM said he could not exclude the evidence.

Examination continued: The holes made, which were not in the original plan, were quite insufficient to allow the gases to equalize, and therefore uneven heat resulted. This, he thought, was the key of the trouble. As the gases passed to their separate chambers, they had to go over the tops of the retorts on either side, and from there they had to leave by a channel on each side. The ideal form of works was that each of these chambers should be evenly heated; and to do this they must assume that each of the chambers had the same amount of draught, so that as the gas rose through the nostrils it should be equally treated. What had happened was that one particular chamber (A) was right away from the outlet duct. After going down to the lower point, the gas from that chamber had to pass the whole length of the channel. That from the next chamber (B) had to pass a less distance; and so on with each chamber that was nearer the duct up to chamber E. The gas in the chamber farthest away from the duct A had the hardest work to do to get out; and therefore the gas from the chamber nearest the duct was getting the whole of the draught, to the exclusion of the other chambers. The result of this was practically that the whole of the heat ascending from the vertical channel went down over the top of the retort and down to the exit, to the exclusion of the others. The effect was that in one particular portion the heat had

risen to whiteness, and was graded away to dull red where the other chambers had been robbed of the draught.

Justice GRANTHAM: What do you say it ought to be?

Witness: I say the whole system is wrong. I say that in this system the nostrils had been turned upside down. They had applied a principle which is good in one respect to a wrong setting. The ovens below had been destroyed, not by direct firing, as suggested by plaintiffs' experts, but by melted material raining on them from above.

Mr. SPOKES: It is suggested that this was caused by direct combustion in the mouth of the ovens. Can direct combustion have caused what you found there?

Witness: No; such a contention is ridiculous.

Is there any evidence of firing down below?—No; nothing like the heat developed above. There was a temperature, I should imagine, of nearly 4000° Fahr. If we had primary combustion enough to destroy the furnaces, how could we get this high degree of heat above? The heat would be spent before the upper part could be reached.

Compared with the damage you found in the lowest combustion chamber, is there anything like it in the producer or the carbon monoxide duct?—Nothing at all. If there had been the same heat, the brickwork would have been all fused in a mass.

The plaintiffs' experts have suggested that this excessive draught in the lower chamber could be got rid of, or reduced by, the proper use of the dampers?—You could have regulated to a more or less degree the total amount of the draught going into the ten chambers; but as all the chambers would be affected, it could not possibly alter the proportion of draught which was going down chambers A to E.

What was the result of your inspections?—I became convinced that no alteration of the installation could by any possibility make these benches effective. They would have to be entirely remodelled and reconstructed.

In further examination, witness said the brickwork of the installation was worse than anything he had ever seen in any similar building. The mortar was too thick in some places, piles of rubble were put in in others, and some of the arches had sagged 6 inches by inferior brickwork. In his opinion, the cross walls between the various chambers might be said to have been built at random, as was clearly shown by the photographs. With regard to what Mr. Herring had said in his evidence—viz., that he (witness) had admitted, when he visited Milan, that the installation was working satisfactorily—that was only because the retorts had been working with small charges for long hours. He thought the explosions that had been mentioned had nothing to do with the damage done to the settings which made it necessary to rebuild them. In almost every gas-works fitted with patent adjustable lids, explosions of the kind occurred; and it was practically impossible to prevent them. He saw no damage done to the retorts or to the surrounding structures by these explosions. He thought the fact that they occurred was quite inconsistent with the existence of back-pressure. He saw no wet coal used in the retorts while he was in Milan, except that in hot weather in Italy it was usual to spray the coal. Deans Primrose was, no doubt, not a first-class coal; but it was bought and used a good deal by gas companies. The over-heating of any chamber would cause the carbon to form more quickly. He had had experience of benches of inclined retorts in operation; and after inspection of the works at Milan he concluded that repair was impossible and that demolition was necessary. This opinion was more and more emphasized in his mind as the demolition proceeded. In a well-built installation, the proper life of the upper parts would be between three and four years, but the furnaces would have to be relined. By the "upper" parts he meant from the regenerator upwards.

Mr. SPOKES: What life ought the regenerators and furnaces to have?

Witness: I have records of my own settings where they lasted from eight to ten years, which is a normal life.

Mr. HAMILTON: The defendants have put down a sum of £3000 as the cost of ascertaining what ought to be done at the works?

Witness: Yes.

Mr. ISAACS said if the question of defendants' damage was gone into, rebutting evidence must be called.

In reply to Mr. HAMILTON, witness said he was specially engaged to go to Milan for the purpose of examining the works for a year at a fee of £1000, with his hotel and travelling expenses. The rebuilding of the works at Milan was going on now.

MR. MARSHALL UNDER CROSS-EXAMINATION.

In cross-examination by Mr. ISAACS, witness said the system of gas making at Copenhagen, where he had been engaged, was at first one of horizontal retorts; but 18 years ago they adopted inclined retorts, and the system was successful up to a certain point. They had not yet reached the ideal system.

Justice GRANTHAM: What is a better system?

Witness: I cannot tell you, my Lord.

Mr. ISAACS: What is the length of the retorts in Copenhagen?

Witness: They were 12 feet; but they are now about 16 feet.

Then you have no experience of 20-feet retorts?—I have always been an antagonist of 20-feet retorts.

That was your view when you went to Milan?—I had an open mind.

Justice GRANTHAM: I am afraid your mind was rather like these nostrils—closed with prejudice.

Mr. ISAACS: Had you not made up your mind that inclined retorts of 20 feet were bad when you went to Milan?—Yes.

It is a question on which experts differ, is it not?—Yes; I think they are pretty equally divided.

Did you go to Milan to inspect the Graham and Morton installation only?—Yes, originally.

Is it true to represent that you were to get £1000 for the inspection only?—When I went there——

Answer me yes or no.

Witness: I do not know. There was no contract made at the time.

Justice GRANTHAM: Then you went on a roving commission.

Witness: I went to inspect. I could have charged anything I liked.

MR. MARSHALL'S ENGAGEMENT AND DUTIES.

In further cross-examination witness said that when he went to Milan in April, there was no contract; but afterwards, in May, he had an agreement with the Directors of the defendant Company. It was not true to represent that he was to get £1000 in connection with the Graham and Morton work only. He was sent out later (in April) on a special mission, to take the technical management of the three works at Milan for one year for the £1000. He had not yet sent in any claim for that time; but he contemplated doing so. The Directors had treated him generously. He had not sent in his claim from motives of delicacy—he did not know how to approach the Directors.

Mr. ISAACS: Your agreement says you were to "undertake for one year, for £1000, the entire management and supervision of all matters concerning the technical mangement of the three works at Milan, including the restoration and modification of the works at San Celso." Now, do you think it was fair to say that you were paid £1000 for the inspection of the Graham benches only?

Witness: Well, I had given a month in April for nothing.

Would the work for that come to £1000?—It might, or more.

Justice GRANTHAM: Or less.

Mr. ISAACS: Did you know that the Company were dissatisfied with their men, and were appointing new officials?

Witness: No; I learned that afterwards.

Are you still in the Company's employ?—Yes; under a prolonged agreement for another year.

Did you know, before you went to Milan, that there had been complaints by the plaintiffs as to the working of the installation by the defendants' men?—I cannot remember.

Did you know there had been complaints as to the coal?—I cannot recollect.

THE DESIGN AND WORKING OF THE SETTINGS.

Cross-examination continued: He could not remember any complaints as to working which had been brought to his knowledge. He did not know till he got to Milan how long the settings had been in use. He knew certain tests had been made before the works were put in operation, but he did not concern himself with them. He certainly found fault with the Graham and Morton settings, and, in the main, his complaint was with the design, which was the chief cause of the necessity for the demolition. His view was that the system could not work properly. When he saw the plan, he thought it was intrinsically wrong; and his subsequent inspection corroborated this opinion. At first—perhaps egotistically—he thought that he could save the ovens by taking out the two centre retorts; but he found that this was impossible, and that he would also have to alter the combustion chamber and the exits for the gases from the ovens.

Justice GRANTHAM: Did you make any report to the Directors after you had seen the plans, and before you went to Milan?

Witness: Yes; and when I saw the plan I said to Mr. Green, who showed it to me: "That design is bound to fail."

Cross-examination continued: Any person of skill would have known, when working the Graham and Morton benches, that something was wrong. He did not know that, as a fact, the benches had worked satisfactorily for a considerable time; and he thought the evidence was to the contrary. Counsel asked witness to assume that the benches for 16 days carbonized 306 kilos. per charge at an expense of 12·9 per cent. of fuel; and he said he should not believe it. Even if the defendants' servants had signed the test-sheets, he should have his doubts. If the benches did this, it would not show an intrinsically bad design, but a "superb" one. He was next asked to assume that the defendants' servants signed the test-sheets showing these results; and he said he did not see what this had to do with him. Counsel then said that he would go into the matter a little; and he proceeded to question the witness closely upon it.

Mr. ISAACS: These tests ran for 16 days. Do you not know that works like these go better after they have been in use for some time?

Witness: No; I cannot agree.

Do you mean to tell me that these works would go well for six months if the design, as you say, was radically wrong?—No; but the evil was accumulating during this time.

Do you say such works could run for six months well, if, as you say, the design was wrong, without the person in charge finding out that there was something wrong?—I say he would have seen there was something wrong. I think if the nostrils were clear at the commencement, it would be possible for the works to run six months.

It might have worked 18 months fairly well?—Yes; it might have done.

Then why did you say that you do not believe that a setting of that design could carbonize 300 charges at an expenditure of 15 per cent. of the coke made?—But 300 charges are nothing to a setting of that description.

But suppose it did carbonize the quantity of coal named, that would be a pretty good result?—Yes.

And with 14 per cent., it would be much better?—Yes.

Do you believe they were doing that?—No, I do not.

Not even if the defendants' servants said so?—[No reply.]

Could you understand how any skilled person could say, after a year's working, that he was thoroughly satisfied with it?—I decline to answer, because the whole thing is on so unstable a basis. I was not there.

Are you interested in this case?—Well, naturally, I am interested in the Company.

Have you heard that these designs are working well at Leeds?—Let me see the design, and I will tell you.

And in Edinburgh?—Oh, Edinburgh is a sealed book to the whole of the gas profession. We have only heard of a "spring cleaning" at Edinburgh once in our lives, and then we were not allowed to be present.

You recognize Mr. Herring as an authority on these questions?—Oh, yes; he is a good friend of mine.

You heard what he said of the Edinburgh works?—Yes; I heard it.

Well, perhaps, as he is a friend of yours, I ought not to ask if you believe what he said?—Oh, that is very delicate ground. Don't press hat question.

Mr. ISAACS: Well, as you ask me, I will not.

In further cross-examination, witness said he believed that in the reconstruction of the Stettin benches at Milan, which was now going on, the old arches of Graham and Morton settings were being used.

He told the Directors, however, it was a pity to put such splendid work in such rubbishy arches.

Justice GRANTHAM: Whose was the "splendid work"?—That of Derval.

Done under your supervision?—Yes, my Lord.

Mr. ISAACS: Was Derval putting in 20-feet retorts?—Yes; I thought it was a pity to waste arches costing thousands of pounds for a whim—an idea.

Justice GRANTHAM: Do you think your idea was a mistake, then?—Oh no, my Lord.

In answer to further questions by the learned Counsel, witness said he thought a furnace designed as was the plaintiffs' could not act well.

Mr. ISAACS: Now, you heard that Mr. Herring said he had a 2-feet fuel bed?

Witness: He tells us so.

Do you believe it?—He tells us so.

Now I will have an answer. Do you doubt it?—Yes, I do. Give us access to Edinburgh.

Well, Mr. Marshall, there are some people who accept the word of a man of honour without requiring corroboration. You mean to say that, though Mr. Herring has sworn that the depth of his fuel bed was 2 feet, and has given his answer in detail, you still doubt his having given a true answer to my Lord?—I do.

Twelfth Day—Monday, May 8.

On the resumption of the proceedings this morning,

Mr. *F. D. Marshall* was further cross-examined by Mr. ISAACS. He stated that he had had practically the technical management of the defendant Company's works at Milan since April last year, including the Stettin benches. The retorts at Porta Nuova were horizontal. In the Stettin benches they had had eight of the furnaces in use which were practically the same as those of the plaintiffs; but they had been altered. Asked if, in the Stettin benches, there were not fuel beds of 500 millimetres, witness said if Counsel would produce the drawings he would verify them. He could not say whether these benches had fuel beds of less than 2 feet.

Justice GRANTHAM: But, my good man, you were Manager of these works.

Witness: Yes; but I do not crawl into red-hot furnaces. If I wanted to find the depth, I should let them cool.

Mr. ISAACS: Were not the fuel beds of these 1 ft. 8 in.?

Witness: That was the measurement shown in the drawings; but I have not had the opportunity of verifying them by entering the furnaces.

Are they now in use?—I believe they are being reset.

THE OBJECT OF MR. MARSHALL'S ENGAGEMENT.

In further cross-examination, witness said he was first consulted by the defendant Company before Easter, 1904—a few weeks before he went to Milan; and he then heard that one of the batteries had been demolished. He did not know the Company were negotiating with M. Derval for a contract for the transformation of the benches. They first approached him on the question of the Derval settings at Nanterre. He was shown a drawing in the office of the Company, and asked to give an opinion upon it. He refused to do so at the time. He believed that when the Company first approached him, the contract had already been given to Derval to demolish the Graham and Morton benches and substitute others.

Mr. HAMILTON said the contract was dated April 29, 1904, and was for the refitting and supply of all the materials in one bench, except the retorts. There was another contract of the 1st of March for another bench.

Mr. ISAACS (to witness): Before the 29th of April, when you first saw the Company, did you know they were negotiating for the transformation of the furnaces?

Witness: Yes; I knew that.

So that at that time it had already been decided to demolish all the Graham benches?—No. One had been demolished; and it was decided to demolish a second.

I see by a letter of Derval's of the 14th of February that he speaks of the intended demolition of four benches?—Yes; but I advised the Directors not to proceed on so large a scale as that at once.

Then at the time you came on the scene there had already been negotiation for the demolition, and you went out to see what the state of things was, and to take over the technical management?—I took over the technical management from the 1st of May; but my first engagement was to generally inspect and report.

You went out really to see if you agreed with the reports of Mr. Green and M. Freyss?—Yes; and to see if anything could be done to save the furnaces.

ANOTHER QUESTION AS TO DOCUMENTS.

Mr. ISAACS: I call for Mr. Green's report.

Mr. HAMILTON: There was a minute of Jan. 26, 1904, which should be before the Court. It is as follows: "Read Mr. Green's report of the 21st on the coke-conveyors at Milan, and on Mr. Graham's letter to the Chairman. The Committee notes the unsatisfactory working of the Graham and Morton benches at San Celso, and they await M. Freyss's report and suggestions before taking action. It was decided to ask Messrs. Graham and Morton to put in a tender for the proposed modification of conveyors." That is why we claim privilege for all reports obtained after that date.

Justice GRANTHAM: I should not have thought that meant taking action in a legal sense.

Mr. HAMILTON submitted that it was.

Justice GRANTHAM repeated that he thought the "action" did not comprise legal proceedings. If he must decide, he should say that Mr. Isaacs was entitled to the documents asked for.

Mr. HAMILTON then produced the documents required; but he submitted that, after refusing to produce them, on the ground that the 26th of January (on which date legal action was contemplated) was a dividing line, all his Lordship could do was to allow his learned friend to produce secondary evidence on the points in question.

Justice GRANTHAM said he must decide against Mr. Hamilton, on the ground that there was nothing in the documents or the correspondence to show that legal action was then contemplated.

Mr. ISAACS then scrutinized the minute-books and other documents produced. He said the defendants had disclosed a part of the minute of the 2nd of February, which said: "Mr. Green attended the Committee and made a verbal communication as to the Milan benches;" but they had sealed up the portion which followed, and which read: "M. Derval was requested to submit a scheme and tenders for the improvement and modification of the Graham-Morton benches."

Justice GRANTHAM: I do not think you need discuss it further.

THE REPORTS ON THE MILAN WORKS.

Cross-examination resumed: He did not know anything of the tests made by M. Freyss. He did not think he (witness) had any instructions in writing before going to Milan. His instructions were, generally speaking, to see if the reports made were correct. He could not remember whether or not the reports advised demolition, though attention was called to the faults. He had a copy of the reports, and would produce them to defendants' Counsel.

Mr. HAMILTON said at the proper time he would produce evidence to show what was in contemplation on the 26th of January.

Mr. ISAACS (to witness): What did the reports say?

Witness: They called attention to the blocking of the nostrils and other defects.

When you came back you made a report?—Yes.

Mr. ISAACS: I call for that report; I submit I am entitled to it.

Mr. HAMILTON said it was made after litigation was contemplated, and was not a thing that ought to be called for.

Justice GRANTHAM said the witness had verified his evidence by looking at the report, and he saw no reason why it should not be produced.

Witness said the report he made after his visit to Milan was not the document he had used to refresh his memory. On being instructed by his Lordship to produce his first report, he said it was called his Milan preliminary report, and was dated the 26th of April.

THE CONDUCT OF THE WORKS.

Cross-examination resumed: He might have said to Mr. Graham, at an interview on the 18th of April: "The Company want to know how to make uniformly good gas, as at present they cannot." Possibly he also said: "I want to find out whether the retorts are being badly treated by the people there (Milan) or whether they are fundamentally bad." When he was in Paris, and before going to Milan, he might have heard that Mr. Bourne had been retired; but he attached no importance to it. He knew there had been trouble with the Company's employees; and heard that there was a deficit of coal, and that Mr. Bourne was partly responsible for it, and had been discharged on this account. He did not know that a reorganization of the technical staff there was in contemplation, as he was not in the Directors' confidence. Mr. Himing might have told him so once; but he could not be sure. He made notes on his visit to Milan [note-book produced]. Counsel asked witness if these notes were written after his first visit to Milan, as he saw the words, "Repair Stettin." Witness replied that he could not tell when he wrote the words, which were simple memoranda of things he wished to see carried out. He should think they were written on the 3rd of May, after his engagement. He came to the conclusion that the Stettin benches needed repairing because the generator was cracked. Asked whether he was of opinion, after May 3, that the remaining two benches of the plaintiffs ought to be demolished, witness said he must refer to his correspondence. When he went to Milan, he did so to see if he could save the remaining two benches. He could not answer the question without seeing the letters. All that referred to Messrs. Graham, Morton, and Co. in the book was the coke conveyors and elevators and sketches and photos. He knew Mr. Herring was in Milan to inspect the settings; and he (witness) pointed out to him at the time anything he thought should be complained of. On his visit on the 19th of April he saw a retort at work; but not a large number. He saw a number of retorts drawn, and in one or two cases the charges were burnt off perfectly satisfactorily. Mr. Herring drew his attention to the satisfactory carbonization. This was the occasion when one of the charges they tested weighed 350 kilos. He admitted that this was satisfactory carbonization; but those retorts had before then been on long hours and short charges. He did not find that the retorts were of good normal heat. He differed absolutely from Mr. Herring there. There were only two of the retorts in which he found any incrustation of carbon at the top. Mr. Herring never inspected the 72 retorts. He was asked to do so, and refused. After he had seen a good one, he said that was enough for him. Witness asked him to go further and see a bad one; but he refused, and witness said he did so on his own responsibility. The incrustation of carbon showed improper working; but he did not admit that back-pressure had anything to do with it in this particular instance. If there had been back-pressure the retorts would have smoked, and the lids would have leaked; and this would have been a sign of improper working. He knew that there was some smoking, but not to any great extent. He did not see any leakage of any consequence. He heard frequent bangs and explosions; and complaints were made to him about them. He was very vexed at the explosions, because they were improper. The correct method was to use a torch when the lid was opened. He found no torches on his arrival; and he gave directions for them to be procured and used. M. Freyss did not tell him why he was not using them, although he (witness) supposed M. Freyss must have known they were required. He asked the foreman, who said the torches were given up because the men misused them. As to the furnace, he did not find an undue proportion of clinker. He saw a quantity of usable fuel with the clinker in the yard, and that was not wrong. He did not hear Mr. Hulse say that "the furnace was completely choked up," or that there was clinker 2 feet by 4 feet. It was absolutely not a fact. He had never heard of clinker of such abnormal dimensions. Direct firing would

lead to glazing, but would not melt the brick entirely. That would be fluxing the surface. He should expect to find this in a normal state of working. He believed the direct firing had no effect whatever. Asked if he gave it as his opinion that the direct firing only caused a loss of fuel, witness said it would expend itself a little over the grate-bars, and had no direct effect upon the furnace.

A brick was then produced which was taken from bed No. 7. Witness said it certainly showed signs of fluxing; but he could not tell what was the reason, unless it was direct firing. Another brick taken from a corner of the duct was produced which witness admitted was badly fused; but he said he was at issue with Mr. Leech on this point. When he examined the place, he did not find any bricks badly fused. He could not say how the fluxing in question was caused. With regard to the dampers, he found them so badly designed and made, that he did not believe they could have been used from the day they were first put in.

In further cross-examination, witness said he was of opinion that the nostrils ought to be graduated, so as to overcome the tendency of the gas to rise. Their shape, in an installation like the one in question, would depend upon how the cross walls were arranged. It was not the fact that the small part of the nostril ought always to be above. He knew nothing of what was done in this matter in Leeds and Edinburgh. He admitted that the draught ought to be regulated, as the upper parts of the settings were, of course, under pressure. Referring to witness's statement that the works at Edinburgh were sealed to the profession, Counsel asked witness if he did not know that between March and September, 1903, many hundreds of people visited and inspected them after they were finished; and he replied that he knew no one who did so.

In re-examination by Mr. HAMILTON, witness, by means of a plan, pointed out to his Lordship in what way the Edinburgh system differed from that in use at Milan. The essential difference was chiefly in the construction of the furnaces. The fault was that the arrangement of the exit passages exaggerated the draught going through the No. 5 combustion chamber. In his opinion, he established, by examination, that the settings at Milan were fundamentally bad, and could not have been spoiled by bad working. Mr. Herring only partly saw the settings. He did not see the retorts which were badly heated, and only partially carbonized the coal. He would not see any more, but said he had seen enough for his purpose. With regard to the bricks which had been shown him as coming from the carbon monoxide duct, and which were much fused, he certainly did not see these bricks there himself. He had evidence that the fusion in the places where these bricks came from was caused by local action, which did not go farther than the place itself.

ANOTHER WITNESS FOR THE DEFENDANTS.

Mr. *A. A. Johnston*, the Engineer and Manager to the Ilford Gas Company, said he visited Milan in May and June, 1904, and examined benches Nos. 6 and 7, which were in course of demolition, and Nos. 4 and 5 which were in action. Speaking generally, he thought the work had been executed very badly; the brickwork being very slovenly done; and the joints were much thicker than they should have been. These ought not to be thicker than the blade of a knife. Wide joints imperilled the whole structure. With unduly wide joints, cracks would develop, and the work would become unstable. He found that common red bricks had been used in places where high temperatures occurred, and they jeopardized the building. The filling-in was of common material, and not so good as it ought to have been. The depth of the fuel bed should never, in his opinion, be less than 3 ft. to 3 ft. 6 in.

The further hearing was adjourned till to-day (Tuesday).

THAMES POLICE COURT.—Wednesday, May 3.

(*Before Mr.* F. MEAD.)

Poplar Borough Council v. Commercial Gas Company.—Road Re-Instatement; The Concrete Question.

To-day a summons was heard which was taken out by the Council for the Metropolitan Borough of Poplar against the Commercial Gas Company for failing to repay on demand the expenses of filling in ground and making good the pavement surface or soil of parts of certain streets within the borough, and of parts contiguous thereto and affected by the works executed, to the reasonable satisfaction of the Surveyor of the Borough, pursuant to the 114th section of the Metropolis Management Act, 1855, and the 82nd section of the Metropolis Management Amendment Act, 1862.

Mr. CHESTER JONES appeared for the Council, and Mr. COLAM (instructed by Mr. G. H. Young) for the Company.

Mr. CHESTER JONES explained that the suit was a friendly one, and was brought to decide a question of considerable importance. Having detailed the nature of the summons and the sections of the Acts under which it was issued, he said that in the borough were two sorts of roads, those in which the wood, asphalte, or setts had under them concrete, and those in which there was no concrete. When a trench was dug, it was impossible to replace all the earth; and if only the same thickness of concrete was put as was there before, or if no concrete was put down, subsidence took place at an early date, and the road could not be said to have been properly re-instated according to law. The Council, who did the paving work, therefore put 6 inches of concrete where there was no concrete before, and 9 inches of concrete where there were only 6 inches before, and called upon the Company to pay for the same. This course was necessary in order to restore the original strength of the road. The Company had paid for re-instating the road except so far as the cost of the extra concrete was concerned; and the action was brought to recover these amounts.

Mr. COLAM remarked that the Company had not refused to pay for more concrete when it was necessary laterally; but it was the extra thickness they objected to.

Mr. CHESTER JONES said the Company declined to pay for what they called an improvement of the road; but there was no improvement really. He would produce evidence to show that it was absolutely necessary, in order to make the road as good as it was before, that the extra concrete should be put in. It had been agreed that the question should go before the Court as a general one, and no amounts had been stated. The point was really one of law, as to what were the rights of the parties. The section said the road had to be re-instated according to the reasonable satisfaction of the Surveyor for the borough; and the reinstatement had not been to the satisfaction of the Surveyor, who was the judge of the position. So long as this officer acted reasonably, and the Company did not comply, they had not carried out their statutory duties. The section the Company relied on was the 111th; but this only provided for a minimum, and he interpreted it as making the Company liable to do something more. The 82nd section was passed to make the Company liable for the re-instatement of contiguous parts, and also that the work should be done to the satisfaction of the Surveyor. The question to his mind was as to whether or not the work had been done to the reasonable satisfaction of this officer.

The MAGISTRATE, overruling an objection, agreed to take evidence as to principle.

Mr. CHESTER JONES said his evidence was to show that it was necessary to do the work objected to in order to properly reinstate the road.

Mr. COLAM thought all the sections must be read together. The 82nd section only confirmed the old law; the new part being the liability for contiguous parts. They admitted they would have to pay for concrete when it was there before, but not for new concrete or for additional concrete. Reinstatement was simply putting back on the pavement, surface, or soil, that which was taken out.

Mr. *H. Heckford*, the Borough Surveyor of Poplar, giving evidence, said that he had known of frequent cases of subsidence where the precautions suggested were not taken. This arose because it was impossible to consolidate the earth that was put back as it was before it was taken out. It was reasonable, therefore, to concrete where there had been no concrete, and put additional concrete where there had been 6 inches of concrete previously. If the Council excavated beneath the Company's mains, the Company compelled them to erect piers on which the mains could rest. What they were asking for from the Company, they always did in their own case. It was a reasonable and necessary request, and no reinstatement took place that did not have it. A bridge or arch of concrete was absolutely necessary for proper reinstatement.

Cross-examined, witness said it was not the argument that the Company must leave out 3 inches of earth in order to put the additional concrete in. He was not satisfied with the work because the soil was not consolidated. To replace did not mean to reinstate. The old Board never required this extra work to be done; but the new Borough Council had confirmed him in his opinion, He had insisted upon these conditions in his old district of Finsbury, and had obtained them in other cases. The Gaslight and Coke Company agreed to them, and the Water Company as well.

Mr. *N. Scorgie*, Borough Surveyor of Hackney, endorsed Mr. Heckford's opinion as to the concrete being necessary, and said he had had these conditions fulfilled in his district for eleven years. Subsidences occurred where these precautions were not taken. In all main roads he insisted on having 12 inches from the Gaslight and Coke Company, and a minimum of 6 inches in other roads.

Mr. CHESTER JONES said he had several other witnesses who would speak to the same effect.

Mr. *Heckford* was recalled at a later stage, and cross-examined by Mr. COLAM.

Mr. COLAM: Is it not a fact that the price you charge includes the cost of correcting subsidences?

Witness: There is no stipulation at all. The Gas Company are required to maintain for twelve months.

You charge for making good subsidences?—On a schedule for reinstatement; but we take care it does not subside.

Discussion ensued between Counsel as to the period of maintenance; and it appeared that if subsidence occurred within three months of the repair, the Company were liable for subsidence up to twelve months afterwards.

Mr. COLAM said that his construction of the statute was that the Company were bound to re-instate the pavement, the surface, and the soil. He analyzed the sections of the Acts in support of this view. They were to put back the soil as well as they could; and the law contemplated that there would be a surplus that would have to be carried away. It was not suggested that they did not do the work properly or use due diligence. What the Company had to do was actually defined by the section. The construction of Mr. Chester Jones was not the meaning of the section. They were being asked to put in something that was not there before—9 inches of concrete where there had been only 6 inches, and 6 inches of concrete where there had been none before. There was a penalty if they did not use due diligence; and the old law was not at all altered by the new law of 1862. The law did not call on them to do anything more than they possibly could. The roads were pulled up for the benefit of the community; and the statute never contemplated that the Company should build arches of cement. There was no suggestion in the sections that the road would not be as good because a macadam crust would not for three or four months be as solid as it was before it was broken up. Subsidences would not occur if the work was properly done; and if it were not properly done, the Company were under a penalty. If any subsidence occurred, the Company were still liable, and had to make it good. They were quite willing to pay for this work. The statute gave them permission to open a trench, and then specified what they were to do—replace the earth and pavement as it was before, and do it to the best of their ability. Now the Council said they required the Company to make such a substantial job of the reinstatement that there would be no possibility of subsidence occurring. In fact, they were required not to do it with the same materials, the same quality, the same thickness as it was before, which the Act required, but to use other materials and of greater thicknesses than there was before. He strongly contended that this view was wrong, and that the law required nothing of the kind. Mr. Chester Jones said that if they had not got it under the old law, they had it

under the new. But this was not so; for the 82nd section only varied the law by making the Company liable for the contiguous parts. If the Council wanted to do what they were now asking, they must obtain a fresh Act. The Surveyor was asking a prevention of subsidence; and there was no provision in the Act to this effect. To construe the statute in the way suggested was an extraordinary reading; for they were asked to put in concrete instead of replace the earth. The point was that the Council were contending for a substantial class of work never contemplated by Parliament.

Mr. CHESTER JONES, in reply, said the case was not one of penalty, but of recovery of moneys for work done. Mr. Colam asked the Court to construe the sections in such a narrow way that, whenever the Company wanted to repair their own private property, the ratepayers had got to pay for it. It was absurd to think that Parliament would ever have passed such an Act. Only by reading the sections in the narrowest possible way would they bear the interpretation placed upon them by Mr. Colam. If his friend's interpretation stood, then the ratepayers would have to pay for the work every time the Company repaired their pipes. The section clearly laid it down that the Company had to give as good a road as existed before; and this admittedly was not done. On his own terms, Mr. Colam's clients did not fulfil the reading of the sections. How could they have made good the pavement, surface, and soil if it was not as solid and substantial as before the trench was made? He did not agree that it was physically impossible to reinstate, because what they required would make the road as good as it was. He submitted that the point was whether the Surveyor was acting reasonably when insisting upon this additional work; and he contended that the Council were entitled to charge the Company with the cost.

After a long discussion as to the wording of the various sections,

The MAGISTRATE, in giving his decision, said he found for the Council. The evidence had been uncontradicted, and he adopted the view of the experts. Unless the precautions referred to were adopted, there would be a subsidence, and the road was not so good as it was before; so re-instatement had not taken place. He had during the course of the argument wavered very much, but he thought the Local Authority were entitled to recover. It all turned on the construction of Section III. of the 1855 Act. He understood by re-instatement that the pavement was to be practically as good as it was before the Company interfered with it. It had been proved that it would not be in as good a state, because variations in levels might occur, which would be dangerous and undesirable. The pavement was to be made reasonably permanent. It seemed to him that an additional obligation was thrown upon the Gas Company. They were to re-instate reasonably; but they were to do it as it had been done before, and not in some other way. As to the satisfaction, he thought this meant that the work was to be done in a workmanlike way to the satisfaction of the Surveyor, and he was not bound by that officer's view. The Surveyor was not an arbitrator to settle that cement was necessary; but he accepted the Surveyor's opinion. He came to the conclusion that it was reasonable, and without the cement the pavement was not properly re-instated.

On the application of Mr. COLAM, the Magistrate agreed to state a case, but adjourned the further hearing of the summons in order that the parties could agree as to an amount upon which he could make an order.

Mr. COLAM said this would give the Company time to consider whether they would ask for an appeal.

Seven guineas costs were allowed; and the case stood adjourned until to-morrow (Wednesday).

Incandescent Gas-Lamp Litigation.

In the Chancery Division of the High Court of Justice last Saturday, the action of the *New Inverted Incandescent Gas-Lamp Company v. Chamberlains Limited*, came before Mr. Justice Warrington. Mr. W. J. Gordon said he appeared for the plaintiffs, who by their notice of motion claimed judgment in default of defence. No one appeared for the defendants. The action was for infringement of patent; and the plaintiffs claimed the usual relief—an injunction to restrain infringement, an inquiry as to damages, delivery up of all infringing goods, and payment of costs of the action. Judgment was entered accordingly.

West Bromwich Gas Supply.—At the meeting of the West Bromwich Town Council last Wednesday, the Gas Committee reported that the sales of gas during the financial year ending the 31st of March were 317,407,000 cubic feet, and the amount of gas-rental received was £40,642. The Chairman (Mr. Wilson), referring to the consumption of gas, explained that there was a reduction of 10,624,000 cubic feet compared with 1903. This was serious, but he pointed out that they would be able to meet all their liabilities, and finish with a fair balance to the good. The report was approved.

New Pipe-Line to Brighouse.—At the last meeting of the Halifax Corporation, Mr. J. Parker, the Chairman of the Water Committee, moved that they should be authorized to lay a line of pipes 6 miles long and 18 inches diameter, from the Albert reservoir to Brighouse, at an estimated cost of £22,000, and that the Town Clerk be instructed to make application to the Local Government Board for sanction to borrow this amount. He said that last July the Council entered into an agreement to supply Morley with water from their Walshaw Dean reservoirs. Prior to this, Morley was seeking to construct a reservoir in the Gorple Valley, which Halifax claimed to be within their water area. The Morley Corporation would lay a line of pipes from Morley to Brighouse, and this would be a cost to them of at least £22,000. Halifax had already two lines of pipes which went from Halifax to Brighouse, the one to supply that borough and the other to supply Thornhill and Soothill. In both these districts the consumption of water had gone up considerably, and the line of pipes now proposed, besides conveying the Morley water, would assist them to a large extent in these other supplies. It was absolutely necessary that the work should be carried out. The authority asked for was granted.

MISCELLANEOUS NEWS.

PUBLIC LIGHTING OF THE CITY OF LONDON.

Gas Supersedes Electricity.

At the Meeting of the Court of Common Council last Thursday—the LORD MAYOR (the Right Hon. John Pound) in the chair—an interesting debate took place on a report by the Streets Committee, in which they recommended the carrying out of schemes (1) for the lighting of Queen Victoria Street and a portion of Queen Street (between Queen Victoria Street and Cheapside) by means of 45 high-pressure gas-lamps in lieu of 27 existing electric arc lamps, at an estimated initial cost of £1376 5s., which will cause an annual saving, at current prices, of £224; (2) for lighting Fleet Street by means of 34 incandescent gas-lamps in lieu of the 12 electric arc lamps, at an estimated initial cost of £120 (exclusive of the cost of making good the pavements disturbed, and fixing the necessary lamp-columns, estimated to cost £100), which will cause an annual saving, at current prices, of £111; (3) for lighting Lower Thames Street from Fish Street Hill to Billingsgate Market and Monument Street, by 33 high-pressure incandescent gas-lamps, including a 1000-candle power lamp on each of the resting-places in front of Billingsgate Market, in lieu of eight existing electric arc lamps, at an estimated initial cost of £456, which will cause an annual saving, at current prices, of £28 11s.

Mr. A. C. MORTON, the Chairman of the Committee, in moving the adoption of the report, said that during the past four or five years the Committee had completed the lighting of nearly all the side streets of the City with incandescent gas, to the satisfaction of the public, while the annual cost was little beyond what used to be paid per annum for flat-flame burners. The Bridges Committee had lit up the whole of the bridges with incandescent gas under pressure with equally good results. It was now proposed to extend the system farther, into some of the main streets. In his opinion, the best test of good lighting was a man's own test—that was to say, for a person to himself ascertain which illuminant was the best to see by. He did not wish to say a word against electric lighting; but he was convinced that it was a complete failure as a street illuminant. In Paris, Berlin, and Vienna, gas had been adopted for street lighting; and the experience of the Streets Committee in the City of London was that incandescent gas under pressure was a very great improvement upon the electric light. He was sorry that there was going to be opposition to the motion, as all the Committee desired was that the lighting of the City should be a credit to the Corporation and the citizens. They might congratulate themselves on what had been done in the side streets, where four times the amount of light which used to be afforded was now given at only a trifling additional cost.

Mr. WALLACE: Who is expected to pay the initial cost of these three schemes?

Mr. MORTON: It will be borne by the Corporation.

Mr. WILKINSON, in moving an amendment to the effect that the report should be referred back, so that further information might be obtained as to the respective cost of gas and electric light, said the Chairman of the Streets Committee wished to force gas upon the public. If the proposals put forward were adopted, the members of the Council would cover themselves with odium, and would be derided and ridiculed by the citizens, because they would consider the movement a retrograde one. (No.) He suggested that the Corporation should go one better, and return to the old oil-lamps. The report was incorrect and misleading inasmuch as in making out the alleged savings that would be effected there was no provision for paying interest upon the money expended or instalments to a sinking fund. Taken at the best, the problematic saving only amounted to the two-hundredth part of a penny rate.

Mr. WALLACE seconded the amendment, though he did not agree with the remarks which had been made in moving it. All the councillors, he believed, were animated by a desire to have the best lighting possible for the City; but were they sure they were going the best way to get it? He suggested to the Chairman of the Streets Committee that this experiment should be restricted for the present to a smaller area by leaving out the Queen Victoria Street scheme; or, in the alternative, that the whole report should be taken back, so that a full one might be presented on the whole matter. He was not interested in electric lighting, but he did not want this important step to be taken without careful consideration and investigation. If the electric light had been a failure, it was desirable to know why it was so.

Other speakers also urged delay.

Mr. WILLIAMS said he had been using 100,000 units of electricity a year, and had been getting his current at as low a price as possible; and he was sorry to say—sorry, because it meant a big expense to him—that he was now going back to gas, as it was 50 per cent. cheaper. Besides being more economical, gas was decidedly a better light than electricity.

Mr. LILE confessed himself as a convert to the merits of incandescent gas. At the same time he would not oppose the reference of the report back, as the more the two systems of lighting were examined the stronger would the case for gas become.

Mr. COOPER said that when coming to business early in the morning he had frequent opportunities of comparing electric light and gas. On one side of the road, which was in Southwark, there were arc lamps; and were it not for the gas-lamps on the other side, which was in Lambeth, people would not be able to find their way about. The lighting of the Newington portion of Southwark (the part lighted by electricity) was a disgrace to the borough and to electric lighting. But even where electricity was at its best, it was not equal to the gas lighting of the bridges. He had never seen bridges better lighted; and he did not believe there were any better lighted in the world. The Electric Lighting Companies appeared lately to have gone to sleep, while the Gas Companies and gas engineers were unceasingly active, and had now got their reward in being able to supply a better illuminant at a cheaper rate than electricity.

Mr. MORTON, in replying, stated he had no feeling in the matter, one way or the other. He had been accused of forcing gas upon the Corporation. But not very long ago a charge had been preferred against him of thrusting electric lighting upon them. (Laughter.) These three schemes were in the nature of an experiment; and it would be observed that the streets selected were in different parts of the City, so that the citizens would have an opportunity of judging for themselves of the merits and demerits of the two systems. If the proposals put forward in the report were adopted, nothing further would be done for a year or two, until the lamps to be erected were thoroughly tested. It would be noticed that in Fleet Street the gas would not be under pressure. He found that in some of the main streets of Paris gas was not supplied under pressure.

On a show of hands, the amendment was rejected by a large majority. The motion was then agreed to; and the Committee were authorized to carry out all the necessary arrangements.

The City Engineer's Report.

The report of Mr. D. J. Ross, M.Inst.C.E. (who till recently held the position of Engineer to the Corporation of London), on the works executed by the Public Health Department in the year 1904, necessarily includes the improvements effected in the public lighting. The incandescent gas system was extended by the fixing of additional lamps in the following districts: North, 114; south, 257; east, 277; west, 259—total, 907. At the end of the year there were 2111 incandescent lamps in use for lighting the City. The high-pressure system of lighting was continued and extended during the year; additional lamps having been put up by the Streets Committee at the following situations: Liverpool Street (junction of Blomfield Street), one of 2000-candle power; Falcon Square, do.; Royal Exchange (front of entrance), do.; Mansion House Street, one of 3000-candle power; Royal Exchange (over entrance to lavatory), two of 600-candle power. During December the water-pressure plant was removed from Ludgate Circus by Messrs. Sugg and Co., and a small gas-engine was substituted to work the five lamps at that spot. In August, two Scott-Snell lamps were fitted up experimentally—one in Queen Victoria Street, and the second in Holborn. A trial lamp of the Gaslight and Coke Company was fitted up on the post at the resting-place in Cheapside, by King Street. It was an incandescent lamp fitted with three "C" burners arranged in trident form; and it was still working at the date of the report. The Welsbach lamp in Holborn was taken down by order of the Streets Committee. A lamp known as the "Carpenter" lamp was lent to the Corporation by the South Metropolitan Gas Company as an experiment, and was fixed in Honey Lane Market. It proved so successful that it formed the basis of the tender received by the Streets Committee for relighting the side streets in December last.

The number of defective gas-lamps noticed during the past year was 2058—viz., 158 flat-flames, 1696 incandescent, and 204 high-pressure lamps. The number observed by the police was 30—viz., 3 flat-flames, 26 incandescent, and 1 high-pressure lamp. The details of the ordinary defects in the incandescent lights were as follows: Feeble lights, 1351; lights gone out, 108; not alight at lighting-up time, 24—total, 1483. In addition, 213 defects in the lanterns were reported to the Gas Company. The number of gas-lamps paid for by the Corporation at the end of the year was 2503; being an increase of 259 during the year. The 16 meters attached to the public lamps in various parts of the City showed that the full contract quantity of gas was given at these lamps; and Mr. Ross expresses the opinion that the contract quantity had been given generally throughout the City, and that the regulators of the lamps were kept in proper condition. The public gas-lamps were lighted, in accordance with the general instructions in force for many years past, whenever fog or unusual darkness occurred. This happened on 41 days during the year.

With regard to electricity, Mr. Ross says the lighting of the main thoroughfares of the City with arc lamps was continued through the year. The number of these lamps in operation at the end of the year was 505. The cost of each is £26 per annum. The lamps were lighted whenever fog or unusual darkness occurred; and this happened on 23 days. The number of defective electric lamps observed during the year was 149. The returns of these defects are made daily to the Engineer by the police; and the City of London Electric Light Company are fined for each failure.

THE PUBLIC LIGHTING QUESTION IN NEW YORK.

The Legislative Investigation.

In the last number of the "JOURNAL," our abstract report of the proceedings of the Legislative Committee on the public lighting of New York was brought down to the end of the fourth day.

At the opening of the inquiry on the fifth day, the first noteworthy matter was an explanation by the Counsel for the Consolidated Company (Mr. Charles F. Mathewson) in regard to the purchases of gas from other Companies at from 28 c. to 40 c. per 1000 cubic feet. He pointed out that there were many additional charges to be added to the initial cost, which would materially increase the cost of the gas before its delivery to the consumers. He said the Standard Company, to whom the Consolidated Company paid 32 c. per 1000 cubic feet, did not supply the holders for the gas sold, and besides the gas was subject to unaccounted-for charges in the Standard system which alone would raise the cost to 35 c. The holder charge account and the interest and maintenance charge would come to at least 5 c. additional—making what might be called the "holder cost" to the Consolidated Company 40 c. This was the price paid for surplus gas of the Mutual Company, who had ample holder capacity for their product. Adding to 40 c. the cost of distribution, taxes, and interest, the loss always incidental to the distribution of gas, and a fair reserve, it would be found, he said, that the cost of the gas delivered to the consumer would be nearer 75 c. than the 32 c. brought out in the incomplete examination. When the full evidence and facts were before the Committee, this would, he added, appear clearly.

Referring to this explanatory statement, the Counsel for the Committee (Mr. Charles E. Hughes) said he should be very much gratified to find that the interests of the public were being conserved by the Gas Company. He had no further interest than to protect the people. Whatever the Company had to show with regard to additional charges must come before the Committee in the shape of evidence. He added: "We want nothing that is not perfectly impartial and fair. But we want the facts, and purpose getting them."

Continuing their investigation, the Committee called for books showing the holdings of the Consolidated Company in the securities of the subsidiary Companies; and a book was produced containing the information. When the Committee examined it, they found in it not only a statement of the holdings, but the private balance-sheet of the Company and the private valuation of the properties acquired. This amounted to $27,000,000, and the combined properties were capitalized at $80,000,000. Many interesting facts were found in the book, which had been so carefully guarded that the Committee had despaired of being able to obtain it. On the instructions of Mr. Hughes, an accountant was put on the Company's books to make an examination of them with special reference to the cost of production at the various stations.

The next day, the Auditor of the New York Edison Company (Mr. H. M. Edwards) was further examined by Mr. Hughes. He showed that the average cost to the Company of producing current for lighting was 2·55 c. per kilowatt-hour; and according to this, they, charging 15 c., made a very large profit. It was maintained, however, that the charges for delivery, interest, and depreciation amounted to more than the cost of production; so that the entire cost of furnishing the current amounted to 8·04 c. per kilowatt-hour. Mr. Hughes also brought out the facts in regard to the consolidation of the eight Electric Lighting Companies into the New York Edison Company in 1900, and showed that $36,000,000 of stock had been issued, based solely on what he termed the "monopoly value" of the business, but what the witness styled its "earning capacity." Mr. Edwards admitted that the $36,000,000 of capital stock of the New York Gas and Electric Light, Heat, and Power Company (the chief constituent undertaking of the New York Edison Company) was represented by the Corporation's "earning capacity;" and they estimated that it was worth it. Referring to the old Edison Electric Illuminating Company, the equity in which, amounting to about $5,000,000, had been bought out by the Light, Heat, and Power Company by a bond issue of $21,000,000, witness said it had a fine "earning capacity." He added that though the Illuminating Company's stock had been bought on the basis of 8·8 per cent, it had actually earned 12½ per cent. in 1899. Mr. Hughes then elicited the fact that the entire properties of eight Electric Lighting Companies had been bought by the Light, Heat, and Power Company by an issue of bonds amounting to $7,500,000. Mr. Hughes then put this question to the witness: "After you had all the properties of these eight Companies, and had also paid $21,000,000 for a $5,000,000 equity in the Illuminating Company, you still issued $36,000,000 of stock. What was that for? What was there then left on which to issue stock?" "The power of the combined properties to earn dividends," replied the witness.

Mr. Hughes then began an investigation into the actual values of the properties for which the $21,000,000 and the $7,500,000 and another $4,000,000 were put out, besides an outstanding funded debt of the Light, Heat, and Power Company amounting to $6,500,000 which had not been paid; the whole making a funded debt of the New York Edison Company amounting to about $40,000,000. He found that the Power Company, who became the New York Edison Company with the addition of $4,000,000 working capital, bought stock and bonds of eight smaller Companies, apart from the Illuminating Company, amounting to $4,434 300 in stock, at its par value, and $4,945,000 in bonds. By reference to reports sworn to by officers of the Companies, and through other documentary evidence, Counsel obtained admissions from Mr. Edwards that the stock of the Mount Morris Electric Company, appearing on the books at par, was actually worth about 40. The stock of the old Manhattan Lighting Company was found to be worth a little below par, and that of the Power Company was worth its par value. But the old Borough of Manhattan Electric Company had no value, as it had no property except that of the last-mentioned Company. The stock of the Yonkers Electric Light and Power Company was worth about 25, apart from its earning capacity; and that of the Consolidated Telegraph and Electrical Subway Company was worth not quite par.

On the resumption of the inquiry on the seventh day, the investigation of the affairs of the New York Edison Company was continued. In answer to questions by Mr. Hughes, it was frankly admitted that in the last five years the Company had made a profit of $6,402,098, besides accumulating a reserve of $4,119,224; making a total of $10,521,322. This profit was made, according to the Company's figures, by selling electric power for lighting at an average rate of 8·04 c. per kilowatt-hour, compared with a cost to the Company, including all charges except the reserve fund, of 5·32 c. The actual operating cost of generating and delivering electric power was given as 3·66 c.; while the expense of interest on $40,000,000, the funded debt of the Company, amounted to 1·66 c. per kilowatt-hour. With equal frankness it was admitted that the larger part of the capital of the Company was represented by its franchises—by its "monopoly value," as Mr. Hughes expressed it. Mr. John W. Lieb then gave some important statistical evidence. He stated that the average income of the Company per kilowatt-hour had been decreasing from year to year, owing to increased knowledge on the part of the consumers as to how to make economical installations, and so take advantage of discounts for use of more power for a smaller number of lamps. In 1900, the average rate received was 9·69 c., with a gradual decrease to the 8·42 c. of last year. Owing, however, to improved facilities for the production of power and to a decrease in the amount necessary to charge for interest, the profits of the Company had largely increased at the same time. In 1900, it was only $384,607; in 1901, it was $624,127: in 1902, $1,546,967; in 1903, $1.552,558; and in 1904,

$2,293,838. At the same time a reserve fund was accumulated thus: In 1900, $519,399; in 1901, $621,432; in 1902, $751,999; in 1903, $1,059,373; and in 1904, $1,167,018. "What has become of that $4,000,000 reserve fund and the surplus?" asked Mr. Hughes of Mr. Edwards. "It has all gone into plant." "And $3,000,000 you borrowed last year from the Consolidated Company; what did you borrow that for, when you had $10,000,000?" persisted Mr. Hughes. Mr. Edwards: The Company needed the money; and it had gone into plant. "We have franchises of tremendous value, because of their large earning capacity," was the substance of the Edison officials' testimony. "We are giving excellent service, and at the same time we have charged enough for the service to give us a profit above all possible charges during five years of $6,000,000, besides laying up another $4,000,000 for a rainy day." "We have only one quarrel with you," said Mr. Hughes at the conclusion of the hearing. "You are charging and profiting too much."

A fact which it was thought would have an important bearing on the inquiry was brought out the following day, when the Committee were investigating the minimum as well as the maximum charges of the Edison Company. It was admitted that power was sold for as low as 3 c. per kilowatt-hour where a consumer had bills aggregating $25,000 a year. Some progress was made on the questions involved in the city lighting contract. The city is charged a flat-rate of 12 c. per kilowatt-hour for all the lighting in public buildings; but as two or three of them have special rates, the average cost is reduced to 11·36 c. It was maintained by officials of the Company that this was a reduction from the retail rate, enforcement of which would bring the average charge against the city up to 13·5 c. For street lighting by arc lamps, for which the city is charged $146 each a year, the Company's estimate of the rate, on the basis of kilowatt-hours, was given as 5·9 c. How great is the volume of the Company's business was shown by the statement that their account with the city for lighting public buildings amounts to only 1 per cent. of the total business.

The feature of the gas portion of the inquiry next day was a statement by Mr. W. B. Hoyt, the Vice-President and General Manager of the Standard Gaslight Company, that he was not aware of the fact that the undertaking was owned, with the exception of a very few shares, by the Consolidated Gas Company. It was put to him by Mr. Hughes that he had heard the evidence to the effect that the Consolidated Company owned practically all the shares of the Standard Company—39,345 preferred and 46,300 ordinary. Mr. Hoyt admitted it, and said it was news to him. He added that he kept the stock-book and paid the dividend, and the book showed that the Consolidated Company owned 5000 shares. The dividend orders make the dividend on the stock payable to James A. Bennett, the Treasurer. "This James A. Bennett," remarked Mr. Hughes, "is the Treasurer of the Consolidated Gas Company; and there is the whole story." Mr. Page (a member of the Committee) said they were wondering at the witness's surprise when he heard that the Consolidated Company owned this stock, seeing that he held dividend orders on the whole of it, and paid the dividends to the Treasurer of the Company, whom he knew to be the Treasurer. "I can explain my surprise when I tell you, on my solemn oath, I never knew how much stock the Consolidated Gas Company did own in the Standard Company," said Mr. Hoyt. "Yes," said Mr. Stevens (the Chairman); "but from the cheques you could make a fairly good guess." "We did not try to cover this thing up," declared Mr. Mathewson. "Oh no, not at all," echoed Mr. Hoyt.

At this point the inquiry was again adjourned.

THE EXAMINATIONS IN GAS MANUFACTURE.

The City and Guilds Question Papers.

We give below the question papers set at the examinations in "Gas Manufacture" held on the 29th ult. under the auspices of the Department of Technology of the City and Guilds of London Institute—the Examiner being, as in recent years, Dr. Harold G. Colman.

HONOURS GRADE.

1. Sketch, without unnecessary detail, the construction of a setting of eight retorts, so far as is necessary to show the manner in which the retorts are supported and the way in which the furnace gases, &c., circulate around the retorts. 2. Discuss the importance of ensuring that all the dip-pipes are sealed to an equal depth in the hydraulic main, and of maintaining a steady vacuum in the latter. 3. What properties must coal possess to be of value for gas-making purposes? Mention the general properties of the different classes of coal employed in gas manufacture. 4. State the procedure you would adopt in getting up a bed of retorts to suitable carbonizing temperature, and in properly maintaining the temperature in the subsequent regular working. 5. What changes take place during the process of condensation, in addition to the cooling of the gas to a temperature approximating to that of the atmosphere? 6. Give sketches showing the construction of the guide-framing of a three-lift gasholder, and of the cup and grip. 7. Describe any one method which has been adopted on a large scale for the prevention of the deposition of naphthalene from gas. 8. State the nature of the reactions which take place in the manufacture of uncarburetted water gas. What is the effect of varying quantities of air and steam on the quantity and composition of the gas produced? 9. Give some account of any recent developments in the distribution of gas under higher pressure than was formerly the case, and of the advantages derived therefrom. 10. What steps would you take to put matters right and to prevent any explosion in the case of a purifier lute "blowing?"

ORDINARY GRADE.

1. Give sketches showing the sections of gas-retorts in common use and the manner in which the mouthpiece is attached to the retort. Why is fire-clay now almost always used as the material for the construction of the retorts? 2. What results follow when the coal is placed in the retort in an uneven layer? 3. Sketch the construction of a generator furnace for heating a bed of retorts, showing the manner in which the combustible gases enter the setting. What is the nature of the gas produced in the generator? 4. At what point, or points, is the ammonia contained in the crude gas eliminated from it, and what other gaseous impurities are partially removed simultaneously with the ammonia? 5. Sketch the construction of a purifier suitable for removing sulphuretted hydrogen from crude gas. Indicate the manner in which the cover is made gas-tight, and the means of holding it in its position. 6. What is the effect on the gas if the carbonic acid always present in the crude product is not removed? How is the removal usually effected? 7. What objects are attained by fixing pressure-gauges at different points in the manufacturing system? Give a general sketch showing the construction of a recording pressure-gauge. 8. What precautions must be taken in connecting services to the street mains and to the consumer's meter? 9. Sketch the construction of a consumer's dry meter. 10. State what precautions you would take in fixing and maintaining an incandescent burner in order to obtain good results.

In the honours grade, 39 marks were allowed for Nos. 1, 2, 6, and 8, and 36 for each of the rest. In the ordinary grade, the higher number of marks were allowed for Nos. 3, 4, 5, and 9.

The Polytechnic Question Papers.

The following were the questions set at the Polytechnic, Regent Street, where the classes in "Gas Manufacture" are conducted by Mr. Walter Grafton, F.C.S., at the examinations held on the 19th ult.:—

HONOURS GRADE.

1. Give sketches, in part sections, of a setting of 10 retorts, generator fired, showing position of retorts to one another, formation of combustion chamber, &c. 2. Describe the De Brouwer charging-machine. What are its advantages and disadvantages over other systems? 3. Describe any one method which is in practical use for successfully eliminating naphthalene troubles. 4. Describe the Dellwik-Fleischer water-gas plant. Give approximate composition of such gas, and explain how it is rendered luminous. 5. Give description of a columnless gasholder, and show by sketches the method of supporting and guiding same. 6. Describe in outline the effect of condensing crude gas under a pressure (*a*) greater or (*b*) less than the atmosphere. 7. By varying retort temperatures, the composition of the products resulting from the distillation of coal alter. Show clearly in what way, giving approximate amounts as between moderate and high heats. 8. Describe clearly, but briefly, two efficient systems of incandescent lighting; the one for indoor use, the other for street lighting.

ORDINARY GRADE.

1. Give sketches of three modern retorts, and state the advantages claimed for each. 2. In some works the retort furnaces are charged with "cold" coke, in others with "hot" coke. How are the carbonizing results affected by such practice? 3. What is the effect of condensing gas? Give sketch showing manner of separating liquid from gaseous products. 4. Describe, with the aid of sketches, the construction of a washer-scrubber, briefly setting forth its advantages over the separate apparatus. 5. Describe the most economical method of removing HS_2 only from washed gas. 6. On the Harcourt table photometer an illuminating gas under examination was found to consume such a volume of gas to maintain a 16-candle flame that the time occupied by the meter in making two revolutions was 1 min. 45 sec. What is the illuminating power, uncorrected for temperature and pressure? 7. How would you determine the amount of sulphur in spent oxide? 8. State the general advantages of gas lighting by such methods as (*a*) flat-flame burners, (*b*) regeneration burners, (*c*) incandescent (mantle) burners, and (*d*) high-pressure incandescent burners.

Only six questions were to be attempted in each paper; and the time allowed was three hours. The following were the results of the examinations: Honours grade—First prize, R. H. Collins; second prize, S. T. P. Perry; third prize, A. G. King. Ordinary grade—First prize, J. B. Macfarlane; second prize, E. F. Jones; third prize, Frank Portass. The first prizes are a silver and a bronze medal; the second and third being of 10s. and 5s. value respectively.

Smaller Gas Profit at Wigan.—For the past year the net profit at Wigan from the manufacture of gas, including the charge for public lighting, was £11,382. The cost of the public lighting was about £4226; leaving an amount available for the relief of the rates or some other purpose of £7056. For the previous year, the profit, exclusive of the public lighting, was £11,050. The decrease on the present occasion is accounted for mainly by a smaller consumption of gas, by lower returns from residuals, and an increase in the rateable value of the undertaking.

Huddersfield Gas and Water Supply.—The receipts of the Huddersfield gas undertaking for the year to March 31 were £100,826, against £100,796 for the previous year; and the expenditure was £70,065, as compared with £72,458. Deducting £14,562 for interest and sinking fund from the gross surplus of £30,750, leaves a net surplus of £16,198. The Gas Committee recommend that out of this £6453 (equal to 2 per cent. on the capital outlay) be carried to the depreciation and contingency account, and that the balance of £9744 be applied to the liquidation of the reconstruction of works account. The financial statement of the water-works shows that the receipts were £56,359. There was transferred from the borough rate £12,422, equal to a rate of 7d. in the pound, against 5d. the previous year; bringing the total receipts up to £68,781. The expenditure was £73,509, leaving a deficiency of £4727. The expenditure includes interest and sinking fund, and £2916, the cost of opposing and settling with the promoters of the Huddersfield Corporation Act 1902 Amendment Bill, 1904. The credit balance of the depreciation and contingencies account is £17,842. The Water Committee have resolved that 7d. in the pound should be provided out of the next borough rate to meet the deficiency and provide for further contributions to the depreciation and contingency fund.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

The Half-Yearly Meeting of the Association was held last Tuesday, at the Cannon Street Hotel, E.C.—Mr. J. HORSLEY PALMER in the chair.

The SECRETARY (Mr. R. W. Wilson) read the notice convening the meeting, and subsequently the following report of the Directors:—

The present half-yearly ordinary general meeting of proprietors has been convened, in conformity with the Association's Acts of Parliament, for the purpose of receiving a report from the Directors upon the affairs of the Company, and of declaring a dividend for the half year ended the 31st of December last.

The following summary shows the results of the Association's operations during that period: The quantity of gas made during the half year was 4829 million cubic feet; and the quantity made in the corresponding half year was 4553 million cubic feet—an increase of 276 millions, or at the rate of 6·06 per cent. The total number of lights on the 31st of December last was 3,223,835; and at the close of the corresponding half year it was 2,963,239—an increase of 260,596, or at the rate of 8·8 per cent. The number of consumers on the books of the Association was 301,361—an increase in the twelve months of 31,907, or 11·84 per cent. The total mileage of mains in use on the 31st of December last was 2078 miles; being an increase in the half year of 77 miles.

The average gross cost of coal was 2¼d. per ton less. At the same time somewhat higher prices were obtained for coke, with the result that the net cost of coal was 6d. a ton less than in the corresponding half year.

The profit of the half year, as shown by the balance sheet, exhibits a satisfactory increase.

The plant and mains at all the stations were maintained in a due state of efficiency.

At Antwerp the third section of carburetted water-gas plant, referred to in the last report, was completed, and put in action.

In view of the continued and rapid growth of the business of this station, the Directors have for some years been waiting for an opportunity to secure a site for new gas-works. In the past half year they were able to acquire, on reasonable terms, the whole of the land and property of the "Vulcain Belge"—a shipbuilding works—in the Commune of Hoboken on the River Scheldt, favourably situated as regards the Association's area of supply. This property, being connected with the railway and having commodious quay accommodation on the river, is an admirable site for a new gas-works.

At Berlin, good progress has been made with the second gasholder in course of erection at the Mariendorf Works, and also with the canal dock there.

The coal handling plant, which will be electrically driven, is nearing completion.

Considerable extensions of the system of mains have recently been made at this station. They include large trunk mains to convey gas at high pressure from the new Mariendorf works to different points in the areas of greatest demand; governor stations being erected, where necessary, to distribute the gas at normal pressure.

At Brussels, the Directors secured a fifteen years' prolongation of their lighting monopoly in the commune of Koekelberg in return for a reduction in the price of gas.

At Frankfort-on-Main, an increase of storage capacity has become necessary at both the works. At the Bockenheim works, the construction of a tank to receive a three-lift gasholder of a capacity of 1,700,000 cubic feet was commenced.

At the Obermainstrasse works, an old single-lift gasholder of 100,000 cubic feet capacity will be removed, and a new three-lift gasholder of 300,000 cubic feet capacity will be erected in the same tank.

At Graslitz, one of the Association's smaller stations in Bohemia, the Directors secured a ten years' extension of their concession in return for the cession to the Municipal electric works of the lighting of certain streets.

At Hanover, as at other stations, the need of labour-saving devices has made itself felt, and the Directors have decided upon an installation of coal and coke-handling plant and of air-driven stoking machinery, the erection of which is in progress and is expected to be completed in time for the ensuing winter.

At Lille, the remodelling of the Vauban works, referred to in the last report, made satisfactory progress.

In this report the Directors desire to record their deep regret at the loss sustained by the Association by the death, on the 2nd of September last, of Mr. E. Drory, Chief Engineer at Berlin, who, during more than forty years, had rendered faithful and valued service.

The Board have appointed in his place Mr. Ernst Körting, formerly Senior Assistant-Engineer at the same station.

In conclusion, the Directors desire to draw the attention of the proprietors to the accounts for the half year ended the 31st of December last. These have been duly audited; and from them the Directors have, in accordance with the provisions of the Companies' Clauses Consolidation Act, prepared a scheme showing the profit of the Association for the half year, and the portion thereof applicable to the purposes of dividend, which they recommend now to be declared—viz., a dividend of 5 per cent. for the half year ended the 31st of December last, payable, free of income-tax, on and after Tuesday, the 9th inst.

The Directors who go out of office by rotation are: Arthur Lucas, Esq., Clarence Pigou, Esq., the Hon. Sir E. Chandos Leigh, K.C.B., K.C. These gentlemen are eligible for re-election, and offer themselves accordingly.

The Auditor who goes out of office by rotation is Joseph Gurney Fox, Esq., who is eligible for re-election, and offers himself accordingly.

PROSPERITY AND INCREASED WAGES.

The CHAIRMAN said it was with great pleasure that the Board met the proprietors that day, and presented them with the report, the adoption of which it was now his duty to move. The reason for their satisfaction was this: Though the returns on this occasion were not quite so large in point of the percentage increase of gas sold as they were six months ago, still everything in the report on the business presented to the proprietors that day bore a favourable aspect. There was a 6 per cent. increase in the amount of gas distributed; there was a large increase in the number of the consumers; and there was a considerable addition to the profits. He did not hesitate to tell them that much of this extra profit was due to the commercial prosperity of Germany and its ever-increasing richness. This was most apparent to those of the Directors who visited Berlin last October and November; and they heard the same at every German station they visited. The principal causes of the prosperity, he thought, must be well known to most of the proprietors present. It was in consequence of the impoverishment of that great neighbouring country which was at war; and this had no doubt tended to add to the riches of Germany. As gas companies always reflected the prosperity of the country where they were doing their business, so the Association had shared in that prosperity. People did say that it was "an ill-wind that blows nobody any good." He was sure they must all hope, notwithstanding the indirect profits which had accrued to the Association from that disastrous war in the far East, that the ill-wind which was blowing there so strongly might shortly become a calm of peace. But with regard to this great burst of prosperity in Germany; it had its disadvantages as well as its advantages. When there was a great deal of money being spent and earned in a country, the wants of the people always increased, their desires for pleasure and amusement had to be met, and, when it got down to the working classes, those demands could only be met by increased wages. As the result, they had at Berlin and Aix-la-Chapelle some months ago to largely increase the wages of the stokers and yardmen. Only the previous week, too, he learned that the Gas Committee of the Municipality of Berlin had decided to raise the wages of further classes of their workmen; so that necessarily the Association would have to follow suit. All this would result in a considerable additional annual expenditure to the Association, which, he was perfectly certain, was not likely to be reduced in the future.

DETAILS OF THE WORKING.

He would now turn to a few of the details of the working of the half year and also to the year, because on Dec. 31 they completed their working year. During the six months, they carbonized 430,000 tons of coal, or above 14,000 tons more than in the corresponding period of 1903. The average cost of the coal was 2¼d. per ton less; and though this seemed to be but a small unit, still it resulted in a saving to the Association of £4500. Then again, owing to the industrial concerns in Germany being in very good case, the market remained favourable for coke, so that the revenue from this source was increased by more than £12,000. Tar did not come out quite so well, because it was adversely affected by the great fall in pitch which took place last year; but with regard to the treatment of ammoniacal liquor, the returns were distinctly favourable. The result, therefore, was that the net cost of coal was 6d. per ton less than in the corresponding six months of 1903. He would now like to refer to one or two items with regard to the year's working. Of course, in their efforts at all their stations to sell gas, their principal endeavour was to push gas among the private consumers, who were their chief source of profit. The amount of gas sold during 1904 was greater than ever before in the annals of the Association. The quantity sold was 8200 million cubic feet; while in 1898, when they had Amsterdam, the whole of Vienna, and Haarlem, it only amounted to 7900 million cubic feet. So also with regard to the consumers. No less than 32,000 additional consumers were placed on the books in the year. This again constituted a record; and here he should like to give the figures for the past four years. In 1901, the new consumers numbered 17 000; in 1902, 21,600; in 1903, 21,600; and in 1904, 31,900. It was interesting also to note that among their consumers (who now numbered over 300,000), they had no less than 70,000 who were prepayment consumers, or 23 per cent. of the total number. In a few remarks on this subject of prepayment meters this time last year, he reflected somewhat upon Aix-la-Chapelle in not being so energetic in placing coin meters as some of their other towns. He did not know whether his remarks were translated to the general public in Aix-la-Chapelle, or whether their Engineer took it very much to heart. Whatever the reason, the result had been very good; the increase at that station during last year having been something like 100 per cent.

THE BERLIN METER FACTORY.

He had said that their business in all quarters was extending. They had a branch at Berlin which was called the meter and stove factory, which was established a great many years ago. But it was moved to new premises on their land at Mariendorf three or four years since, because the work had outgrown the former buildings; and it was necessary they should have a complete factory worked by machinery. The new place had fully justified the capital which had been expended upon it. Their meters were recognized as being of first-class make; and with the large number of new consumers coming on every year, it had been almost more than they could do to cope with the demand. However, to give the proprietors a few figures in this connection, he might say that in 1903 they turned out a total of 30,044 meters—24,700 being ordinary, and the rest prepayment; while in 1904, they made 44,248, of which 34,000 were ordinary, and 10,000 prepayment. This was quite a business in itself; and a very interesting business it was for the Directors to examine into when they visited that station.

PROFITS, MUNICIPAL PAYMENTS, AND PENSIONS.

Now a few words about the accounts. The profit which they made this year—after paying the debenture interest, the income-tax at 1s. in the pound, and allowing for an increasing charge for the depreciation of their concessions (£39,000 against £36,000)—showed the satisfactory increase of nearly £10,000; and it was interesting to observe that this profit was from the workings alone—that was to say, not taking into account the dividends or interest on their investments in London and elsewhere. In fact, the profit from the working was only £8500 less than the sum required to pay the half-year's dividend on the capital stock. He drew particular attention to this, because he knew that a great many of the proprietors were much interested in this item of the accounts. Their attention had been called on previous occasions to certain charges of an increasing character. He had himself frequently mentioned them. Among them were the payments to the Municipalities. The amount paid during the past half year amounted to £53,000, or £2000 more than in the corresponding six months. But there were also other charges of a serious nature, which he did not think had ever been touched upon at the meetings of the proprietors. He referred to the charges for pensions, allowances, and sick pay. The Association had

now been in business 81 years; and with a salaried staff of nearly 650, and workmen to the number of 7000, the pension list was a large one, and was growing. It was a continuous growth, and had given cause for a great deal of consideration at their Board meetings; and they would have sooner or later to provide in some way for the future of their employees by a special fund. Of this he felt certain. The pensions to officers, and widows and children of officers, now amounted to £20,000 per annum; to workmen, £15,500; and for sick pay to workmen and other grants, he had to add £10,000—a total sum of £45,700. The workmen's pension scheme entitled a man at the age of 55 years, who had given the Association 25 years' good service, and on proof of his unfitness for further work, to draw an annual pension, without contribution on his part, equal to half of his average wages during the previous five years; and this was increased by one-fiftieth for each additional year of service. A widow of a workman received one-third of the sum the man would have had. In regard to the officers, however, no scheme existed. Although it was their invariable rule to treat all cases as they arose in a very liberal manner, it had occurred to the Directors that the question (it was, in fact, at the present time receiving consideration) whether a scheme somewhat analogous to that of the workmen, but involving a contribution on the part of the officers, should not be instituted. He merely mentioned this now, because in future half years they might have to appropriate a sum from the profits to provide a pension fund for their salaried officers.

UNDEVELOPED FREEHOLD PROPERTY.

Regarding the balance-sheet, he wished to draw attention to an item which had never before appeared there. It was called "Freehold Property on the Continent, £89,589." He did not think the title was well chosen, because they had a great quantity of freehold property on the Continent which was included in the plant at the stations; but this new item referred to property which had been purchased, but which had not yet been brought into working state (as it were) at any station where it was held. In one instance, it was property which they had let on lease for purposes of their own; and in the other case (accounting for the principal amount of £84,817), it represented the purchase of the property at Antwerp, which was briefly alluded to in the report. For many years past, they had seen the city of Antwerp growing with great rapidity; and the Board had recognized the fact that, before long, they would have to build an entirely new works at that station. The difficulty had always been, both with the Directors who had visited the place and with the Association's officers on the spot, to find a suitable site for new works combining railway accommodation and a good river frontage. It so happened that the Vulcain Belge—a shipbuilding Company—had to go into liquidation. Colonel Le Roy Lewis and himself visited the place and found it to be an admirable site for a gas-works. They strongly recommended the Board to purchase it; and it fell into their hands at a very reasonable figure. Immediately the land had been purchased, gentlemen of the City of Antwerp proposed to repurchase it at a profit. He was glad to say they failed in their object. They even approached the Government to assist them. But the property still remained in the hands of the Association; and it would be, in the opinion of the Board, a very valuable asset for the purposes of the Association in the future. He had no doubt the proprietors had seen in the papers recently that the government of Antwerp had decided to extend very largely the docks and quays, which, of course, would bring fresh business to Antwerp and to the Association.

THE INTERPRETATION OF A CONTRACT.

He must now take the proprietors into the realms of the Law Courts. It was not often the Directors had to report that they had engaged in a lawsuit. The Directors of the Association were very much averse to any proceedings of that sort; and always tried, in their dealings with the municipal authorities, to settle any differences in an amicable manner. There had, however, been an event at Hanover which necessitated an appeal to the Law Courts. It was necessary, in order to explain the matter, to go back a little. The Association made a contract with that city some years ago, which provided that in 1925 the business should be handed over gratuitously to the Municipality. It was also provided that any pieces of land which the Corporation might add to their boundaries should be considered as coming within the terms of the contracts. The Association, in the course of their business at Hanover, had made a good many outside contracts with communes which were governed by their own independent bodies; and the Directors naturally thought that these contracts with these communes held good until their termination. When, however, the City of Hanover incorporated one of these communes, the Municipality said: "This commune which you have been lighting on other terms, must now come under the terms of our contract with you." Against this the Board protested. The matter was taken to the Law Courts—the First Court, the Court of Appeal, and finally to the highest Court—and he regretted to say the Association had lost on each occasion.

THE JUBILEE OF MR. KÖRTING.

This was all he had to say with regard to the half year under review. But it was usual for the Chairman to mention any subject of particular interest which might have occurred since the end of the half year, One of the most interesting matters had been the jubilee of Mr. Körting, of Hanover. He was their Chief Engineer there; and he completed his 50 years of loyal service on the 1st of January this year. The actual celebration and festivities connected with his jubilee, however, did not take place until Jan. 7; and, in accordance with a promise that he made to Mr. Körting some time ago, he (the Chairman) braved the horrors of two of the very worst passages he had ever encountered between Flushing and Queenboro', in order to assist at the celebration. But he was exceedingly glad to go, because Mr. Körting had been one of the most faithful of servants to the Association. It was indeed a perfect delight to him (the Chairman) to see how Government officials, City Authorities, his colleagues from other towns, the principal men of art and learning in Hanover, and also the workmen, vied with one another to contribute to the happiness of Mr. Körting on that day.

LARGE CONTRACTS AND WORKS' VISITS.

Since December 31, the Directors had made some large contracts for the coming year. They were forced to go into the markets rather early because they had to ship 275,000 tons of coal, instead of 210,000 tons as last year. Unfortunately, they had to go into the market at a time when there was a good deal of disturbance among the Westphalian miners. However, they concluded some very satisfactory contracts, and at only 2d. per ton more than they paid last year. In conclusion, he said the Directors had been active in the promotion of their duties and also in looking after the interests of the proprietors during the half year. Mr. Corbet Woodall had been on many occasions to the various stations on the Continent, and had only just returned from a visit. Sir Charles Jessel, Colonel Le Roy Lewis, Mr. Birchenough, and himself (the Chairman) had also visited various places, and had found everything in order, and going on well. This was all he had to say, excepting that Mr. Newton desired him to express his regret and apologies to the proprietors for his absence from the meeting that day owing to the state of his health.

Mr. ARTHUR LUCAS seconded the motion.

Mr. JOHN DREW observed that the Chairman had not told the proprietors anything about carburetted water gas, as to whether it was used at more than the one place referred to in the report.

Sir JOHN RUNTZ said there should be some word of congratulation to the Directors from the proprietors' side of the table on their excellent report. The Association was not only progressing, but it was going on by leaps and bounds. It was satisfactory to find that the profit of the half year exceeded that of the previous year. The Directors of the Association, it was clear, gave a great deal of time and personal attention to the interests of the proprietors; and this, together with the results they had before them that day, augured well for the future. He had listened with great pleasure to the Chairman's record of the half-year's working; but there was one point he wished he had touched upon—that was, the question of residuals. Lord Beaconsfield said on one occasion that "the chemical market was the barometer of the commercial world." He (Sir John) was sure some figures as to the results of the residual business during the year would be of interest to the proprietors.

The CHAIRMAN, in reply, said they had carburetted water-gas plant installed at Antwerp and Brussels. But in Germany—he would not say it was not possible, but it was not prudent to work carburetted water-gas plant, because there was such a heavy duty on petroleum. He thought he had mentioned with regard to the residuals that they had had a very profitable half year. Coke realized £12,000 more than in the corresponding period of 1903; and the products of ammoniacal liquor—because they manufactured sulphate muriate, caustic, and so on—were more favourable than in the corresponding half year.

The motion was unanimously adopted.

Proposed by the CHAIRMAN, and seconded by Mr. J. H. BIRCHENOUGH, a dividend on the half year of 5 per cent. on the £3,800,000 stock was declared, free of income-tax.

The re-election of the retiring Directors was the next business. On the motion of the CHAIRMAN, seconded by Mr. C. PIGOU, the Deputy-CHAIRMAN (Mr. Arthur Lucas) was returned to his seat. On the proposition of Mr. R. TINDALL, seconded by Mr. BIRCHENOUGH, Mr. Clarence Pigou was re-elected, as was also the Hon. Sir E. Chandos Leigh, K.C.B., K.C., on the motion of Colonel LE ROY LEWIS, seconded by Mr. TINDALL.

The retiring Auditor (Mr. J. Gurney FOX) was reappointed on the motion of Mr. HARRIS, seconded by Mr. PILCHER.

Proposed by Mr. JOHN DREW, and seconded by Mr. L. WILKINSON, the Chairman and Directors and the officers, staffs, and workmen of the Association both at home and abroad were very cordially thanked for their services.

BUENOS AYRES (NEW) GAS COMPANY, LIMITED.

The Annual Meeting of the Company was held last Thursday, at the London Offices, No. 1, East India Avenue, E.C.—Mr. F. J. HESELTINE in the chair.

The SECRETARY (Mr. J. M. Macmorran) having read the notice calling the meeting, it was agreed to take as read the Directors' report and the accounts for the past year.

THE PROFITS AND THEIR DISPOSAL.

The CHAIRMAN could venture to say that the report and accounts which he had the privilege of presenting to the shareholders would be received by them with satisfaction, as they showed very clearly that the property was in a sound financial position. It would be observed from the report that there was to the credit of revenue account the sum of £82,006, made up of £65,483 profit for the year, and £16,522 brought forward from 1903. He might say that the profit would have been larger but for the very low selling price of residuals, and for certain exceptional charges which had to be met out of revenue, such as the rent of the temporary offices occupied by the management and staff during the rebuilding of the central offices in Alsina (which were now near completion), to the large increase in taxes, and to the higher cost of production occasioned by the labour difficulties which their Company and all enterprises in the Argentine had to cope with, and by which many industries were seriously affected. The Directors had appropriated the £82,006 in the following manner: To the 4 per cent. debenture interest, £10,000; and to the interim dividend paid of 6s. per share, £15,000. Of the balance, they placed £10,000 to the reserve fund, bringing it up to £80,000; and had increased the renewal and contingency fund by £7500—making it £12,500. After writing off the agreed annual charge from discount and expenses *re* issue of debentures, £2112 4s., the Board proposed to pay a final dividend of 8s. per

share, which, with the interim dividend, made a total of 7 per cent. (or 14s. per share) for the year, free of income-tax—leaving £17,394 to be carried forward. Out of the year's revenue, £19,333 was expended on the upkeep of the works, mains, &c., which were reported by the Manager to be in a high state of efficiency.

OTHER FINANCIAL POINTS.

Referring to the more important figures and to other matters which had claimed the attention of the management both at home and in Buenos Ayres during the year, he said that on the debit side of the balance-sheet it would be seen that since the shareholders last met, the capital authorized and subscribed had been increased to £600,000, by the issue of 10,000 shares of £10 each. These new shares, which were now fully-paid and quoted on the Stock Exchange, participated in all profits made from Jan. 1 of the present year, and would in other respects rank *pari passu* with the previous ordinary shares. This issue was authorized by the shareholders for the purpose of securing the rights and interests of the South Barracas Company, which had been worked by their own Company on a lease for the preceding fourteen years, and also for providing such funds as would become necessary for the contemplated extensions and alterations to these works, as well as those on their own works at Patricios. Now, although these rights had been secured, the South Barracas remained a separate and distinct Company (in accordance with the agreement with the Municipality of the district), and was carried on as such under an entirely different staff, subject, of course, to the control of their local representatives. The profits, however, accrued to this Company as the holder of the debentures and shares. They were thus, in addition to this advantage, in a position to make additions and extensions for the development of the business as might be required without incurring the liability of having to pay a premium of 50 per cent. on the outlay, as was the case under their lease. The extensions and additions (which they were now energetically pushing forward, connecting up other townships) had already resulted in an increase to the business; so that they had reason to believe that the money spent in the foregoing operation had been securely and profitably invested. The reserve, contingency, and redemption funds, to which he had alluded at previous meetings, now stood at £107,113, or £17,500 more than the previous year. Of this, £80,000 was free and available for the equalization of dividends, or for any emergency that might occur in the future. Sundry creditors figured for only £11,212, against £22,337 the year before. On the credit side of the balance-sheet, the property account was increased by £12,847. In this was included the extension of mains and the expenditure on additional plant, such as purifiers erected by Messrs. Drakes Limited (a photograph of which some of the shareholders might have seen in the "JOURNAL OF GAS LIGHTING"), washers, condensers, inclined retorts, new water-gas plant, and coal store and elevator, all of which had been found necessary to meet the increasing business. To this outlay they could therefore take no exception. The cash at bankers, bills receivable, and municipal bonds stood at £55,124. These accounts spoke for themselves; while the £98,829 represented by the 4 per cent. debenture stock and shares of the South Barracas Company formed a very large portion of the sum held in the reserve and contingency accounts.

BUSINESS DEVELOPMENT.

The business of the Company, he was glad to say, steadily progressed; the increase in the quantity of gas sold during the year being 9·16 per cent. over that of 1903. This increase (which was satisfactory, in view of the large number of incandescent mantles now in use) was due in some measure to the demand which went steadily forward in the heating and cooking department, which now seemed firmly established; but, although the number of stoves fixed had been considerable, still, in the opinion of their Manager, they had not gone ahead in this line with the rapidity which would have been expected had the gas used for heating been further reduced in price in accordance with his proposal. The Board had not, however, abandoned the idea of trying to bring it within the reach of every householder; and, as a result, the questions of tariff and candle power had been discussed at times by the Companies supplying the city, as well as with the Municipality, and had formed one of the most important questions of the year. But no definite decision had yet been arrived at. It was probable, however, they would be called upon to study this question anew, when it was hoped the conditions mutually fixed upon would be such as to permit this important industry to develop without restraint, as had been the case wherever these vital questions had been arranged on a business-like footing. As he stated in his opening remarks, the sale of the residuals, especially coke, was disappointing, and lessened the profit by about £4000—the price per ton being exactly 20 per cent. lower than the year before. However, in the middle of December, the Directors, together with the other Companies, raised the price, and hoped to be able to maintain it through the present year. The surplus production of tar had found a ready sale at a fair price. The work affected in the improvement of the public lighting by the substitution of incandescent for flat-flame burners was most satisfactory, as the whole of the 6682 lamps the Company lighted for the Municipality had been converted. All these lamps were either of 60 or 200 candle power.

THE NEW ENGINEER.

He was again pleased to be able to report that the relations of the Company with the Municipal Authorities were cordial, and that they and the Government rendered material assistance in putting an end to the strike among their employees. Following close on this strike, the Engineer, who had been in their service for many years, tendered his resignation, which he desired to take effect at the expiration of six months, in accordance with his agreement. This resignation the Board accepted, and immediately set about endeavouring to find a duly qualified gentleman to fill this particularly important post. He was pleased to say, and the shareholders would, he was sure, be glad to know, that they had been successful, having engaged the services of Mr. James Dougall, late Engineer and Manager of the Isle of Thanet Gas Company (Margate), who was about to proceed to Buenos Ayres by the Royal Mail steamer sailing next day. The Board had also engaged a very competent foreman, who was already on his way out. Mr. Dougall came of a family well and favourably known in the gas world, and he had for some time acted as the Company's Technical Adviser. He therefore went out with a general knowledge of the works he was to manage. He was of the modern school of gas engineers, well up in the most recent improvements that had been made in this country and on the Continent in the manufacture of gas and the treatment of the bye-products; and he brought with him the highest testimonials from those under whom he had served. He (the Chairman) thought they might congratulate themselves on his appointment; for, under his management, they looked for even better results than were now obtained, seeing that at Margate his administration was distinctly successful. The manufacture of gas and the treatment of the bye-products had made great strides of late years, and was now a profession requiring a considerable amount of technical ability and knowledge of chemistry. In Mr. Dougall they had found a gentleman well equipped in these requirements.

LABOUR TROUBLES.

The year under review had been one of great prosperity in the Argentine Republic. Unfortunately, however, it was handicapped by serious labour troubles. Strikes were frequent in every department of business. It was therefore only to be expected that the gas industry would suffer as wages had to be advanced, and the hours of work reduced, so that the cost of production was necessarily increased. In connection with this subject, he, in the name of the Board, desired to bear testimony to the zeal, loyalty, and devotion to the Company's interests shown by the Local Committee (one of the active members of which, Mr. Gibson, they were pleased to see with them that day) and the management and staff, who, during this time of stress, by their personal assistance and efforts, avoided what would have been a serious public inconvenience and possible danger, had the supply of gas been interfered with. By the firm action of the Government, declaring "martial law," work was, however, soon resumed throughout the country, and great activity, especially in building, had since taken place. Under all the circumstances, he thought they were justified in looking, with some confidence, to a continuance of the Company's prosperity. He then proposed that the report and balance sheet be adopted, and a dividend at the rate of 7 per cent. (free of income-tax) be declared, 3 per cent. of which had already been distributed.

Mr. J. C. IM THURN seconded the motion, which was unanimously carried.

The retiring Directors, Mr. F. C. im Thurn and Mr. Ross Pinsent, were re-elected, on the motion of the CHAIRMAN, seconded respectively by Mr. PINSENT and Mr. ROBERT NESHAM.

On the proposition of Mr. PILLEY, seconded by the CHAIRMAN, the Auditors (Messrs. Turquand, Youngs, and Co.) were re-appointed.

Mr. J. C. IM THURN moved a vote of thanks to the Local Committee and staffs both in London and Buenos Ayres. He spoke of the perfect harmony which existed between all those responsible for the management of the Company.

Mr. PINSENT, in seconding, said that no one better than those who had resided in the country could appreciate what the work there was. The past year had been one of unexampled difficulty; and he thought their thanks were specially due to their Manager (Mr. Obarrio).

Mr. GIBSON (as a member of the Local Committee) acknowledged the vote. He said the year they had gone through had been a difficult one; but it was not more so to them than to other industrial concerns in the country, because labour troubles were everywhere. And in their own case, the troubles were much less than those of many other people. Their men were hard-working and loyal; but in the general wave of labour agitation it was only natural their men should be sucked in too. The effect of the strike was really not very serious to them. It was quickly handled and quickly got over; and in a very short time their men were working very cordially, and were indeed glad to get back to their work again.

Mr. S. SIMMELKJÖR proposed, and Mr. SHEERMAN seconded, a cordial vote of thanks to the Chairman and Directors.

The motion having been heartily carried, the CHAIRMAN responded, and the proceedings terminated.

BOMBAY GAS COMPANY, LIMITED.

Reduction in the Price of Gas—Increased Dividend Foreshadowed.

The Ordinary Meeting of the Company was held last Thursday at the London Offices, No. 6, Drapers' Gardens, Throgmorton Avenue, E.C.—Mr. H. E. JONES in the chair.

The SECRETARY (Mr. J. H. Perrins) read the notice convening the meeting and the Auditors' report; and the report (which was noticed in the "JOURNAL" for the 25th ult., p. 243) and the accounts were taken as read.

The CHAIRMAN said he now had the pleasant duty of moving the reception and approval of the report; and in doing so, he had one or two announcements to make which he thought the shareholders would regard as being extremely satisfactory. This was why he used the strong term "pleasant duty." At the time of the issue of the report, the Board were negotiating a renewal of the contract for the public lighting for a period of ten years. It was not, however, then ratified exactly; and therefore they could not go into the matter fully in the report. But since that date specific terms had been laid before the Board, and accepted by them; so that, subject to the actual wording of the contract, they might consider the matter settled. This was very satisfactory, because it covered a total number of 4000 lamps, as against the 3200 which they previously lighted; and if the shareholders would look at their accounts, they would see that the Company derived a large proportion of their income from public lighting. The proportion was larger than in the case of any European company with which he was acquainted by at least double. They would understand, therefore, how important it was to their interests that this contract should have been secured for a further

period. The contract was accompanied for the first time by certain penalties, to which, however, the Board did not object. It was also accompanied by, he thought, the very reasonable provision that if the Corporation wished to experiment with any other form of lighting, they might terminate the arrangement with the Company at certain times. He, however, apprehended nothing from this, seeing that they had now thoroughly exhausted in this country the battle between electric lighting and gas. The handsomer the cities were, and the greater the desire for efficient lighting, the better gas got on. A few public authorities in England still stuck to electricity; but this was not the rule. For instance, in this very city, which was the centre of the universe—the most important city in the world—the recent transactions of the Corporation showed that they were ordering still further removals of electric lights and the installation in their place of gas-lamps—going back, indeed, to the light which their fathers used. Recently, at a gathering of the Institution of Gas Engineers, Mr. R. O. Thompson, the Chief Engineer of the Melbourne Gas Company, who was present, said he had passed through Bombay, Vienna, Paris, and other cities; and he declared that Bombay was the finest lighted place he had been in. He (the Chairman) could not refrain from thanking Mr. Thompson for this tribute, which they must recognize was due to a very great degree to their former Engineer and present Director, Mr. Louis Penny, under whose supervision, aided by that of his (the Chairman's) own son, the transformation from ordinary gas lighting to the incandescent system in Bombay was made some years ago. This change had been so well effected, and everything had been so well maintained, that he looked with the utmost confidence to the impossibility of the system being replaced by any rival light—economically as well as efficiently considered. One item in the report that would be noted with some satisfaction was that during the year 1904 the sale of gas increased by 2 per cent. This was not a great deal; but their Company had, like others, been during the last few years extending the use of incandescent gas lighting. He might mention that they had just had a very large order for mantles to be sent out for a single fortnight's requirements. This could not, of course, be effected—this transition which economized the supply of gas needed by a consumer from 50 to 60 per cent. could not be carried out—without modifying the gross amount of gas consumed. But for this, the increase would have been larger. Looking to this increase and the general position of the Company, he had the further pleasant announcement to make that the Board had been discussing for some little time the possibility of adding something to the dividend; and while he did not want to prophesy until he knew, he thought he might tell them that next year's dividend would—unless something entirely unforeseen occurred—be ½ per cent. more than the present one. He took this opportunity of making the announcement so that the shareholders and the public might know of the matter at the earliest possible date. With regard to the reduction in price to private consumers of 8 annas per 1000 cubic feet which took effect in January last, the Company had not reduced the charge for so long a period that he felt they must at any risk take a forward step in this direction. The possibilities with regard to the effect of this action on the income had made the Board hold their hands, and not distribute the additional ½ per cent. on this occasion; but the Manager (Mr. F. W. Chamberlain) sent home such encouraging reports of the condition of things, in spite of the slight recrudescence of bubonic plague and cholera, that the Directors felt entitled to give the shareholders the intimation he had just made. The balance of the profit and loss account was £21,716; making with the amount brought forward (£42) a total of £21,758; and after allowing for the interim dividend paid in December last, and placing £2000 to the reserve fund (which the proprietors would note with pleasure), there remained £12,558. Out of this, the Directors recommended a dividend of 3½ per cent., free of income-tax (which meant nowadays nearly another ½ per cent.), making 6½ per cent. for the year, and leaving a carry-forward of £4158. This latter figure was very satisfactory, as compared with the £42 brought into the accounts; and it furnished the key to the consideration the Board had been giving to the question of dividend. He ought almost to have begun his speech by stating that the Directors had lost in the interval since the last meeting their much valued Chairman, Mr. Robert Davidson; and in accordance with the Articles of Association they had appointed a very distinguished officer, Field-Marshal Sir Evelyn Wood, V.C., G.C.B., to a seat at the Board. In connection with the Board of this Company, the Directors always studied first knowledge of gas matters (there were two gas engineers on it); and then they looked for knowledge of finance, and especially knowledge of India. The latter qualification was an important one; and he (the Chairman) believed that unfortunately he was the only Anglian among them. He, however, endeavoured to make up for his want of local knowledge by his knowledge of the technicalities of the business. He wanted now to tell them where the £4000 odd additional carry forward had come from. The income from gas had improved by £800, from residuals by £500; and there was a somewhat casual increase of £900 from fittings account. The latter item, however, they must not reckon as permanent; it only showed that the Manager had been very busy, and people had been renewing their confidence in gas by fitting up their homes more than before. Coal had cost £2400 less, and there was a reduction in income-tax of £200. But against this £2600, £800 more had gone in improvements of works, £600 in improvements to mains, and £200 in general expenses of management—due to certain extra passages of the staff coming to England. This made £2200 extra income, and a net decrease of £1000 in expenditure, or a gain of £3200. The balance was made up of various smaller items. This was the statement of their position; and he ventured to think it was a very gratifying one. He thought, however, he derived more gratification from the knowledge that they had reduced the price of gas in Bombay since the first day of this year than from any other feature, exceptionally good though they all were. He concluded by moving the adoption of the report and accounts and the declaration of a dividend of 3½ per cent., free of income-tax, making 6½ per cent. for the year.

Major W. F. Gordon seconded the resolution.

Mr. W. Cuff said the shareholders were in the habit of receiving excellent reports; but he thought that upon this occasion he could congratulate the Board on having a specially good one. He could not but regret the fact that their valued Chairman of the past had been obliged to give up his position, though he felt sure that their interests were perfectly safe in the hands of the Board. If the Chairman had not alluded to the possibility of an increased dividend next year, he certainly thought he would have done so himself.

The motion was then carried unanimously.

On the proposition of the Chairman, seconded by Mr. Louis Penny, the retiring Directors (Mr. E. A. Flinders and Major W. F. Gordon) were re-elected, as were also the Auditors (Messrs. Magnus Ohren and G. E. Robinson), on the motion of Mr. S. Gore-Browne, seconded by Mr. Stanhouse.

Mr. Oke proposed a vote of thanks to the Chairman and Directors. He remarked that it was very gratifying to the shareholders to learn that there was a prospect of an increase in the dividend. This showed that the Company had been carefully managed; and the fact that the contract for the public lighting had been renewed on satisfactory terms and for so long a period (considering that the street lighting was so large an item in the accounts) was also exceedingly gratifying.

Mr. Cuff seconded the motion, which was carried.

The Chairman, after briefly returning thanks, proposed a similar compliment to the staff. Many of them, he said, worked a long distance away, and it was necessary to trust a great deal to them; while in the Secretary they had a most faithful servant.

Mr. Ennis having seconded the vote,

The Secretary, in a few words, returned thanks on behalf of the Manager (Mr. F. W. Chamberlain), the staff, and himself.

SOUTHAMPTON GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Wednesday—Captain A. J. Corse Scott, J.P., in the Chair.

The Secretary (Mr. E. W. H. Eady) read the notice convening the meeting; and the report was taken as read. The latter stated that, after payment of debenture interest and all other charges, the amount available for dividend was practically £20,000. The Directors recommended the payment of the maximum dividend, amounting to £12,004, for the half year on the ordinary stock, less income-tax. This would leave the sum of £7996, of which £5000 had been invested to augment the reserve fund; the balance of £2996 being carried forward.

The Chairman, in moving the adoption of the report and accounts, remarked on their satisfactory character. With the addition now made, the reserve fund amounted to £36,953, out of an authorized total of £54,400. During the past half year, he said, over 315 million cubic feet of gas had been sold, being an increase of nearly 6 millions as compared with the December half of 1903; the increased sale for the whole year 1904 amounting to the gratifying total of over 25 million cubic feet. The Board felt, however, that it would, perhaps, be too much to hope that such very large increases would continue to be recorded in the immediate future, as the almost universal adoption of the incandescent system had materially reduced the consumption of gas for lighting purposes, thus conferring a considerable benefit upon the consumers. Notwithstanding this anticipation, the Directors were pleased to report an increase of 750 new customers on the slot-meter system during the past half year, which would tend to considerably augment the demand for gas. There had also been a steady increase in the number of consumers under the ordinary system. The receipts for residuals had only increased £62, as compared with the December half of 1903, notwithstanding that larger quantities had been sold; and there did not appear to be any immediate prospect of an advance in the market values of these products. Stockholders would see from the report that the new stock issued amounted to £11,680 ordinary stock at £111 per cent. and £400 of 4 per cent. debenture stock at £110 per cent., which the Directors considered satisfactory prices. With reference to the local rates, the fact that consumers already paid 1½d. per 1000 cubic feet to meet the charge for rates was sufficient evidence of the burden now imposed upon the Company, which the Guardians were seeking to increase, though the Company had not been informed to what extent. The Board expressed the hope that the rating authority would see their way to meet the Company in an amicable and businesslike manner, so that a settlement of this matter, just to both the ratepayers and the Company, might be arrived at, and the enormous expense involved in a poor-rate appeal avoided. A gasholder was in course of erection at Eastleigh, to serve as a distributing centre, in order to maintain and give a sufficient supply of gas to Eastleigh and the surrounding districts, including Chandler's Ford; so that, should an increased demand for gas arise there, the Company would be ready to cope with it. The Directors greatly regretted to report the occurrence of a serious explosion at the Northam Conservative Club, whereby two persons were injured, and a good deal of damage to property occasioned. At the present moment, the Board wished to state that the whole of the circumstances were receiving very careful consideration. They desired to express deep sympathy with the sufferers in the accident, which was undoubtedly due to a fracture of the gas-main by a steam-roller.

Mr. J. C. Moberly, in seconding the motion, thought it only right that the shareholders should be warned that they could not hope in the future for the great increases upon those increases that had taken place; and his reason for saying this was that they must remember that the price of gas had been reduced in the added areas so as to make it equal with that charged in the old borough. The price had been really reduced 6d. per 1000 cubic feet in the added areas. This would take effect from Jan. 1 last. Another thing which would affect them was the proposal to increase the rating; but this would, he hoped, be amicably arranged. Possibly the next accounts would not be of that rosy colour which had been the case on the last three occasions.

The resolution was carried, the dividend recommended was declared, and the retiring Directors and Auditor were re-elected.

The proceedings concluded with votes of thanks to the Chairman and Directors, the Secretary, the Resident Engineer (Mr. S. W. Durkin), and the staff.

A REVIEW OF THE WELSBACH COMPANY'S POSITION.

With the exception of a couple of shareholders who, receiving now 5 per cent. on their ordinary share holdings, desired a larger dividend from the funds the Directors are accumulating in the interests of the Company, there was quite a chorus of approval and satisfaction at the close of the comprehensive and clear exposition of the Welsbach Company's position which the Chairman (Mr. Miles W. Mattinson, K.C.) made to the shareholders at their annual meeting yesterday. Directly the Secretary (Mr. W. Resbury Few) had read the notice calling the meeting, the Chairman commenced his address, which alone took rather more than an hour to deliver.

FINANCIAL RESULTS.

Mr. Mattinson proceeded at once to the key of the position in the profit and loss account—viz., the net balance, after deducting charges, carried to the credit of the balance-sheet. That figure is £91,601; and it compares with £98,047 twelve months ago. The difference of £6446 is almost entirely accounted for by the less dividend received from the Austrian Company in respect of the year ending March, 1904; the slight difference of £435 representing a trivial falling off in the results of the English business. These are results very closely corresponding with the Chairman's forecast of twelve months ago; and any person could have anticipated them with exactitude if he had attended to what was said on that occasion. Speaking then with reference to the Austrian Company's dividend, the Chairman told the shareholders that in consequence of several causes—one of which was the complete expiry of the mantle patent in Austria, and another the continued loss of the "B" or electric undertaking—it was expected that the dividend to be received from Austria would be less than in the previous year. The expectation was that the Austrian dividend would be somewhere in the neighbourhood of £30,000; and in September, the Welsbach Company did, as a matter of fact, receive £30,439. Deducting this sum, £61,262 is left as the profit on the English business during the twelve months. Applying a like test to the figures of twelve months ago, and deducting from them the larger dividend received from Austria in respect of the year ending 1903, the profits to be attributed to the English Company were £61,697—a close shave between the two years, although it does chance the profit of this year falls short of the profit of the previous one by the small sum of £435. Sketching last year the course of the trading, so far as the English Company were concerned, the Chairman showed that the net loss of above £20,000 three years before had been converted, by wholesale retrenchments of waste, into a profit of over £50,000 the following year, and over £60,000 the particular year of which he was then speaking. It is also to be recollected that he went on to observe that it was not reasonable for the shareholders to expect—under the conditions of trade which then prevailed, and which were likely to do so—that the business would continue to advance by leaps and bounds. That caution, the Chairman pointed out yesterday, had been justified, because during the past year the business has been maintained practically at an equilibrium. In his view, having regard to the general conditions which prevail, this is a most excellent result—at any rate, quite as well as, possibly better than, the Board or the shareholders had a right to anticipate.

PAST AND PRESENT TRADING AND FRESH ENTERPRISE.

During the last two or three years, the Chairman pointed out, the Company have been passing through a transition stage—from monopoly prices to competitive prices. The inevitable result is that the management have been brought face to face with steadily falling prices, and but for the fact of the Company's large output, and the free use of the great cash resources at their disposal, which enabled the management to buy in the best market and upon the best terms—but for these things, combined with the most careful, intelligent, and enterprising management of the business by Mr. L'ce Fletcher and the zeal of his subordinates, it would not be, the Chairman asserted, possible to obtain any considerable profits at all. Of this Mr. Mattinson is certain, that, during the coming year, the Welsbach Company will have the best of any business going, and they will get the best of any prices obtainable. The Board have recently as regards the trade, and are almost immediately as regards the public, putting into operation a further reduction in prices of some of the mantles manufactured by the Company. It is not an unreasonable anticipation, the Chairman thinks, that a reduction in the cost of some of their mantles to the popular price of 4½d. will lead to a very considerable increase in the amount of the trade; but whether the increased volume of trade will compensate for the reduced prices, of course, remains to be seen. But while the mantle is certainly the most important of the articles dealt in by the Company, the shareholders were asked not to run away with the notion that all the profits of the English business, or anything like all, were made out of the mantle. During the past two or three years, the miscellaneous business of the Company has steadily grown; and the management are hopeful that, in this direction, further growth will be witnessed. The Kern radiator has been a source of profit during the year; and there is every reason to think that its popularity will further increase. During the last twelve months, the Company have also placed upon the market a high-power lamp, from which, the shareholders were informed, most excellent results had been obtained, and in regard to which there is much promise of still better results in the future. This high-power lamp is made to give an illuminating power of 150, 300, or 600 candles. Now, within a short time, Mr. Fletcher hopes to be able to place upon the market a lantern of the same description, which will give as much as 1000-candle power—that is, the Chairman emphatically pointed out, 1000-candle power not dependent on any new or costly or difficult apparatus to work; but merely 1000 candles the result of the action of the burner, the mantle, and the chimney. Of the high-power lamps on the market last year, he said some thousands have been sold, and they are exceedingly popular. More than this, the Company expect very shortly to introduce a Kern inverted lamp. This will be a burner combining the undoubted advantages of the Kern system with the many advantages and many novelties connected with the inverted system generally.

THE CHAIRMAN FORESHADOWS RETIREMENT—FURTHER FINANCIAL EXPLANATIONS.

So much for the prospects of the immediate future of the English business. Still following Mr. Mattinson, he explained at length the reason for lumping certain items together in the profit and loss account; and one quotation from his remarks under this head will suffice: "This incandescent trade is a highly competitive trade. You have keen rivals on the Continent and in this country; and if you are to hold your own, you cannot afford to give away any information with regard to the details of your trading which it is possible to withhold from your competitors." A further reason for making the changes in the accounts on this occasion is one which the shareholders heard with much regret; and it was subsequently remarked upon by them. The Chairman said the pressure of his own engagements are so great, that he fears it will not be possible for him to much longer continue in his present position in the Company; and, this being so, he was desirous that these changes should be put into operation as soon as possible. However, the first item on the creditor side of the profit and loss account is the balance of profit, after making provision for several things. The amount is £62,081 compared with £70,337 in the preceding year. Both these figures are gross ones. Then interest amounts to £7461, against £6265—a very gratifying increase of £1200. This is an item that ought to give the shareholders considerable satisfaction. Twelve months ago, the Chairman drew attention to its history. Then he pointed out that, in the first or second balance-sheet the Company issued, the item of interest was upon the wrong side of the account—it was a debit of £1870. This position gradually improved; and at the time of the change from the old to the new *régime*, it was about level. The item then increased to £3000 credit, then to £6000, and now to over £7000. It must be anticipated, however, that it will be somewhat less next year, for two reasons—in the first place, the Company are now, it is explained, freely distributing its cash resources in dividend, and it is not possible for the shareholders to have dividends in their pockets, and at the same time for the Directors to have the money in the bank, or wherever it may be, to go to the credit of the item for interest. In the coming year, too, the Company will not have the advantage of employing and obtaining interest upon the sum of about £62,000 which they held until the 1st of February in the present year; for it has been paid away in the redemption of the balance of debentures. So that, while interest will be less, the item of debenture interest (which this year works out at £2400) will disappear. The Chairman had nothing special to refer to on the debit side of the profit and loss account; and he dismissed it with the remark that, eliminating the Austrian figures, the net result came out within £435 of the year before—notwithstanding the reductions in prices of goods. The old debenture debt, however, is a sore point with the Chairman; and it again cropped up in some remarks on the balance-sheet. He spoke of the creation of the debenture debt of £110,000 at 5½ per cent. as "one of the most lamentable incidents of the many lamentable incidents of the Company in the past." The shareholders, however, have honourably met their engagements; and every debenture holder has been paid 20s. in the pound, and his interest. Now the Company are free of any obligation of this description; and the extinction of the debt leaves the preference shareholders in a very favourable position. The preference shareholders, in fact, have now practically the first charge upon the goodwill—the valuable goodwill of the English Company. They have the first charge upon the liquid assets, £120,000 of which is invested in high-class securities, as well as the first charge upon the valuable interest in the Austrian Company. The Austrian dividend of £30,000 alone will for the past year pay their dividend within £6000. It is a strong position. The market price of the securities held by the Company at the present time is in excess of the price at which they figure in the balance-sheet; and they have a sum of £180,000 as an absolute liquid resource.

THE AUSTRIAN COMPANY AND THE OSMIUM LAMP.

In connection with the affairs of the Austrian Company, there was manifestly great satisfaction among the shareholders as the Chairman proceeded to unfold the story ending in the complete consummation of the efforts of the Board to free the gas (or "A") portion of the concern from "the incubus of the electric (or 'B') undertaking." Difficult and complicated have been the negotiations; but it has all ended now—the division has taken place, and the balance of the debt of the "B" undertaking to the "A" undertaking of £20,000 has been honourably paid by Baron Auer. The Company have no longer the chance—the "off-chance," the Chairman described it—of some share in the "profits" of the Osmium lamp. But the profit from the gas part of the business is no longer liable to be diminished by the losses on the electric undertaking. Most important of all, the credit of the Company can no longer be pledged for this adventure; and, in particular, the Company are no longer under the specific obligation which prevailed under the old state of things of finding 1,100,000 florins, or £90,000, as working capital for the "B" undertaking. In the Austrian Company, there are now two businesses—the fluid factory at Atzgersdorf; and the making and selling of mantles and burners in Vienna. The capital of the Company is now £125,000; and on March 31 last, the Welsbach Company held £122,000, or practically the whole of it. The par value of the shares is 1000 gulden, or about £83 6s. 8d.; and there is not the slightest doubt, said Mr. Mattinson, that the shares are worth more than their par value. He kept an important announcement for the end—that the trading in Austria last year resulted in the declaration of a dividend last Thursday of 30 per cent. against 25 per cent. the previous year. In consequence, the Welsbach Company have received £36,600, which will come into the next accounts.

The statement of the Chairman ended in the adoption of the report and accounts, the passing of which carried with it the payment of a final dividend after the rate of 6 per cent. on the preference shares and 5 per cent. on the ordinary shares; the increase of the reserve account by £15,000; and an augmentation of the carry-over from £7000 to £10,500. The remaining business was purely formal.

HALIFAX CORPORATION TAR-WORKS.

Proposal to Discontinue Operations.

At the Monthly Meeting of the Halifax Town Council on Wednesday last, Alderman Wadsworth, the Chairman of the Gas Committee, moved the resolution of which he had given notice—"That, in face of the adverse result of the balance sheet showing the working of the tar-works at the gas-works since its commencement, it is inexpedient to continue to work this department." In doing so, he remarked that nearly seven years ago the then Gas Committee presented to the Council a scheme for putting down tar-works; and the estimated cost given was £6000 or £8000. When the works were constructed, it was found that the cost was rather over £20,000. This large capital expenditure meant a charge, in interest and sinking fund alone, of something like £1000 per annum, on the basis of a 48 years' repayment. It was probable, however, that before half the time had gone by the plant would have become useless, and would have to be renewed out of revenue. During the past 21 months, the loss on the tar-works had been £4400. It had been equal, independent of interest and sinking fund charges, to 12s. on every ton of tar made. Probably they might be carried on at a less loss in the future than had been the case in the past. His own belief, however, was that they would never be made to pay interest and sinking fund charges. The loss experienced worked out at 1d. per 1000 cubic feet of gas made.

The first member to discuss the matter was Mr. Hartley, who asked whether those present had ever known a business involving a large capital outlay to be built up in two or three years. They had been handicapped at the tar-works by the want of sound management; and his conviction was that, if they secured a capable man as Manager, and appointed a Committee to go into all the details of the work, they would come to the conclusion that, conducted on commercial lines, the works could be made a success. Mr. Morley also thought that the works had been so mismanaged that they had not yet had a chance. They were told, he said, that the reason the works would not pay was because they were over-capitalized, and because there was not sufficient material for them to be working constantly. The facts were eloquent enough themselves. They commenced with 2600 tons of tar in stock. The works had been so mismanaged that, at the end of the first nine months, they had 2884 tons in stock. At the end of the next twelve months—on March 1 last—they had 3723 tons of tar in stock. Yet they were told the works were too big. It was self-evident that the works had not been looked after as they ought to have been. Not only had they neglected to use the works in distilling tar, but they had had such mismanagement that the bye-products had been handled two or three times, and then had not been commercial products. There was no business man on the Council, with an expenditure of £20,000, and starting *de novo*, who would expect to build up a business connection in 21 months. The tar-works and tar distillers of the country were so dealing with the market that nearly every gas company and corporation in Scotland were considering the institution of tar-works, to get the best results from their bye-products. Was this the time for them, as a corporation, after the evident mismanagement, the lack of grip of the work, and lack of control of those who were responsible, to say that they had done all they could to make the works pay? Municipal enterprise was always subject to an exceptionally big drain in its early existence. They had actually paid £667 in interest before they commenced to do anything whatever; and for sinking fund they had depreciated the cost £256. Altogether there was a total of £1335, which was excessive and exceptional expenditure that would not occur again. They had paid in interest and sinking fund since they began to build the works, £2493. Five per cent. on their capital outlay for 21 months was £1823; so that they had paid £670 more than 5 per cent. Yet they were declaring a loss! It was a false way of looking at municipal enterprise. No greater folly could be advised than the closing of the works.

Mr. Starr observed that the bad management and the loss incurred on the tar-works were due to the ignorance of the Committee and the man they got to manage the works. There were only two others, besides the Halifax Corporation, who had adopted the particular mode they employed in tar distilling. What it was that prompted them to go in for a system that was universally banned, he did not know; but the result was that, when they advertised for a manager, every applicant they interviewed knew nothing about it. If they continued the system, they would have to engage as manager a novice, who would have to buy his experience. He was not going to defend the late tar-works manager. Many of the faults attributed to him, however, were due to the bad machinery he had to work with. He was satisfied that, with the system they had employed, the works would never be made to pay. Mr. Skinner mentioned that, according to information given to him, the life of the still was so short that in two or three years' time it would require renewing. This weighed with him in supporting the resolution. The works, he was convinced, could not be made to pay unless the capital was very considerably written down.

The resolution was also supported by Alderman Hey, who said that, on the figures before him, he could adopt no other course. They were told glibly about "writing off;" but this meant money out of the ratepayers—out of the gas profits—as directly as if they laid a rate of 2d. or 3d. to produce it. If it was true that the tar-works were over-capitalized by three times, was it possible for any manager to make the undertaking pay? Then it was said that the capacity of the site was not sufficient; and no living manager could turn it into a profitable concern if this was the case. He did not see how, under the conditions that prevailed, they could expect a man to make a profit. Were they going to be content to accept the loss as it stood, or go on twelve months longer and pile up another loss? Alderman Crossland inquired whether it would not be best to begin again at the beginning by taking out the present plant and starting afresh; and Mr. Taylor expressed the opinion that the root of all the trouble was that the Gas Committee made the mistake of separating the gas engineership and the tar managership. They could only get out of the difficulty by appointing a Committee in conjunction with the Tar-Works Sub-Committee. The latter was so divided that it was impossible to work it. Mr. Swaine asked if it was not a fact that twelve months after the still was ready for working the Committee had two offers to run it and pay 5 per cent. on the capital—thus demonstrating the fact that the place was not over-capitalized from this point of view? Mr. Collinson said that a private gentleman had, subject to the willingness of the Council to dispense with the plant, made an offer to take the works over on certain terms. The blame in the matter rested on the old members of the Committee; the present ones had done their best with the concern. Mr. Parker and Mr. Fawcett both advocated the appointment of a Committee.

In the course of his reply to the discussion, Alderman Wadsworth said he had no knowledge of the matter referred to in Mr. Swaine's question. He firmly believed that the still at the tar-works was a mistake; it worked the wrong way. In the past, the Gas Committee had been blamed for not coming to the Council with their difficulties soon enough. That was largely why he had pressed this matter. Personally, he did not mind what decision was arrived at; but, as Chairman, he declined to have the responsibility of having another bad year with the tar-works unless he had the Council's order that he was to go on.

Alderman Smith remarked that, when they were first mooted, he strongly opposed the establishment of the tar-works. What had been done, however, was done. They were in a serious position; and they wanted, as members of the Council, to try and arrive at the best manner to get out of it. The Corporation had a large sum of money invested in the works; and they did not want the loss to be increased; but they desired to save something if they could. He moved, as an amendment, that a Special Committee, consisting of six members of the Tar-Works Sub-Committee and six members of the Council, be appointed to consider the best way of dealing with the plant at the tar works, and to report. Mr. Parker seconded the amendment, which was accepted by Alderman Wadsworth and agreed to; the members of the Committee from the Council being subsequently appointed.

THE GAS EXTENSIONS AT NOTTINGHAM.

The supplemental report of the Nottingham Corporation Gas Committee regarding the proposed extensions of the Basford works and the condition of the Radford station (which was referred to in the issue of the "JOURNAL," May 2, p. 327) came before the City Council last week. The Committee propose, in order to meet the heavy demand during the winter months, to erect modern and up-to-date plant in the uncompleted retort-house at Basford—a house which is equipped with the most modern and efficient appliances for the cheap handling of gas, coal, coke, and residuals. It will, however, they point out, still be necessary to retain in working order the less efficient plant at the Radford works for use during the winter months and in case of emergency. If the suggested extensions were carried out at Radford, it would necessitate pulling down and dismantling existing workable plant to make room for the new plant; and this would involve *pro ratâ* about double the proposed capital outlay. By erecting the plant in the uncompleted retort-house at Basford, not only will the cost of manufacture be reduced at this station, and the initial cost of the extension be considerably less, but, what is of much greater importance, the Committee by so doing will be adding to the total available producing capacity of the combined gas-works in the mid-winter season, which would not be the case if the plant was erected at Radford by pulling down and reconstructing the existing and at present workable apparatus.

The Chairman of the Committee (Mr. E. Harlow), in moving the adoption of the report, urged the necessity of the extensions. He said there were now 12,000 gas-fires in use in Nottingham, and the number was gradually increasing; while, in addition, there were some 35,000 cookers and 600 gas-engines. The maximum daily consumption they had had was 10½ million cubic feet, in round figures, which was about ¾ million more than previous records; and as the maximum daily production at the three works was 9¼ millions, there was a deficiency on that particular day of 1¼ million feet. The storage capacity was 8½ millions; and it was safe to assume that, in cases of exceptional demand, they would probably have 5 million cubic feet of gas stored in the three holders for reserve. In Nottingham the capital employed per 1000 feet of gas sold was 11s. 11d., compared with 10s. 10d. by the large English corporations, or a difference of 1s. 1d. against Nottingham. Taking the English joint-stock companies, their capital employed per 1000 feet averaged 9s. 9d., or a difference of 2s. 2d. against Nottingham. As to the Sheffield Company, with which Nottingham had so often been compared unfavourably, their capital employed was 7s. only—a difference of 4s. 11d. against Nottingham. Capital had been utilized very lavishly in the past. This was not, however, the fault of the Committee, but owing to the terms upon which the old Company were taken over by the Corporation. The Committee were actuated by a desire to carry out the necessary extensions at the least initial cost, and to secure the most economical and effective results possible. In other words, they desired to secure the best business results for the benefit of the ratepayers; and he had confidence that the Council would agree with the Committee that the sum of £18,000 spent in fitting up the retort-house, in order that the machinery and the large purifying plant could be kept working to its fullest extent, would tend to this end by securing greater economy.

In the course of the discussion which followed, Alderman Radford said it seemed to him that, if the undertaking was to be conducted in a sound manner, it was a matter of urgency that an adequate amount should be set aside for the purpose of meeting depreciation and replacing of plant, for it was clear that the ordinary operation of the sinking fund was not sufficient. Mr. Lovett moved that the matter be referred back to the Gas Committee for further consideration. He remarked that it was all very well to spend £18,000 to put the Basford works in order; but what had the Committee been doing with the money previously laid out on the Radford works? The closing of the Radford department would be a very serious matter to the ratepayers in the district; and he hoped the Committee would see

their way to put the works in proper order. Mr. Sands thought they must look at the matter in the interests of the town at large. To put in modern retorts at Radford, the Committee would have to build larger houses. What they wanted to do was to secure retorts in addition to those at Radford. So long as they had modern plant sufficient for normal demands, they could very well use antiquated plant to cope with any special demand for a few weeks. The cost of labour at Radford was double what it was at Basford.

Replying to the discussion, the Chairman said that one of the things the Committee were considering was what provision had been and should be made for replacing obsolete plant. A great deal of the entirely new plant had also been charged to revenue. In reply to a question as to how many men would be thrown out of work by the passing of the report, he would say at once that no men would be so affected. The reason for the proposed extension was simply the abnormal amount of gas demanded. The Radford works were the smallest, and the plant was obsolete; and the Committee's policy had been to concentrate the making of gas at the works where it could be manufactured most economically. Money had not been spent at Radford, because the works were small and the plant of an old type; and to put in modern plant they would have to raze the whole of the buildings to the ground and start afresh. Therefore, their policy had been to gradually close the works. They would, however, undoubtedly continue to make gas at Radford during the winter months, when the demand was at its maximum.

Only six members voted for the amendment, and the report was therefore adopted.

CHEAPER GAS FOR MANCHESTER.

At last Wednesday's Meeting of the Manchester City Council, the recommendation of the Gas Committee that the price of gas should be lowered, as from June 24, by 1d. per 1000 cubic feet—from 2s. 4d. to 2s. 3d. in the city, and from 2s. 7d. to 2s. 6d. outside—was carried by a large majority.

In again bringing forward the recommendation, Alderman Gibson pointed out that the Committee proposed to devote £50,000 of the profits of the undertaking for the relief of the rates. But this was not all. The Committee were only asking for £62,000 this year from the City Fund for public lighting, instead of £71,000, the sum paid on this account last year. Besides, the penny reduction would reduce the cost of lighting in public offices by £1000. In the course of a long discussion, Sir Bosdin T. Leech opposed the recommendation on the grounds that the reduction would benefit large consumers outside Manchester at the expense of Manchester ratepayers, and that, even so, it was too small to be appreciated even by those whom it would benefit. Mr. Plummer, who also opposed the resolution, said that ten years ago the city got relatively more benefit from the gas-works than it did now. In 1892, the capital was £1,633,814, and the contribution to the rates was £55,596, or a percentage on capital of £3 8s. In 1898, the capital was £2,223,000, and the contribution to the rates was £50,700, or a percentage of £2 5s. 7d. The gas capital now was £2,840,000; and the Committee were proposing to contribute to the rates £50,000, or a percentage of £1 15s. In 1892, the rates were relieved by 5·21d., in 1898 by 4·44d., and now by 3·22d. The contribution to the rates ought to have increased with the capital. In 1892, the City Fund paid to the Gas Committee for street lighting £39,684, when the contribution from the gas profits was £55,596. Therefore the Gas Committee paid for the whole of the street lighting and contributed to the rates £15,000 besides. In 1898, the City Fund was charged for street lighting £44,800; while the gas profits contributed to the rates £50,900—that was to say, the net contribution to the rates had fallen to £5000. The sum now put down for street lighting was £67,000, and the Committee proposed to give £50,000 in relief of the rates; so that the City Fund had actually to find £17,000. Would it not be advisable for the Gas Committee to take over the street lighting, and then there would be an end to the recurring discussions as to the allocation of the gas profits? After other members had spoken, Alderman Gibson said he had been asked whether the Gas Committee would pay for the street lighting of the city instead of giving £50,000 out of the profits. He thought he might say for the Committee that they would undertake to do this. He did not want to be bothered with this everlasting contribution to the rates. The Committee would therefore be willing to light the streets—and to light them well—out of the profits of the undertaking. He reminded the Council that the Committee reduced the cost of lighting the streets by £9000 last year; and they were therefore really contributing nearly £60,000 to the rates. He added that, of course, the new arrangement, if it were sanctioned, would not come into force until next year.

DECREASED SALES, LARGER PROFITS, AT ROTHERHAM.

In submitting the annual report on the gas-works to the last Meeting of the Rotherham Borough Council, Alderman Gummer, the Chairman of the Gas Committee, said the undertaking was in a better position now than twelve months ago. The coal carbonized during the year was 22,774 tons, as compared with 24,639 tons in the previous twelve months; while the gas made had been 266,899,000 feet, as against 280,682,000 feet, and the gas sold 234,200,000, against 243,247,000. There was therefore a decreased make of 13,783,000 feet, and a decreased sale of 9,047,000 feet. To make a comparison, he would go back to the year when the electric light came into use. In 1900, the make of gas was 256,712,000 feet, and the sale 231,646,000 feet, so that the make and sale of 1900 were on a par with those of the present year. In 1900, the sales showed an increase of 12½ per cent. on the previous year; and this year showed the loss in sales to be 3·86 per cent.—making a difference of 16½ per cent. during the two years. It was pleasurable still to know that the automatic meters showed an increased consumption of 658,000 feet. The ordinary meters and public lighting exhibited a decrease of 9,705,000 feet, against a decrease last year of 1,963,000 feet. In the two years, therefore, they had a decrease of over 11,668,000 feet. He thought this was accounted for by bad trade, incandescent lighting, and the competition of electricity. During the year, the following savings had been effected: Coal £4042, purification and sundries £138, repairs £1187, and renewals £145—total, £5512. They had unfortunately received £2484 less for residuals, &c. The gross profit this year was £15,533, against £13,479 last year; and the net profit was £5629, against £3664, with decreased sales, which represented a loss of profit of £600. Directly trade improved, there was not the slightest doubt the gas consumption would increase. After a brief discussion, the report was adopted.

GAS EXHIBITIONS AND COOKERY DEMONSTRATIONS.

There was quite a "boom" last week in demonstrations of the value of gas for illuminating and culinary purposes. On Tuesday, His Royal Highness the Duke of Connaught opened, at the Royal Horticultural Hall, Vincent Square, Westminster, the 16th exhibition of the Universal Cookery and Food Association. The chief object in organizing these exhibitions, as emphasized by the President of the Association (Mr. W. Burdett-Coutts, M.P.) on the occasion of the opening ceremony, is to promote the interests and worthily represent the art of cookery in all its branches. One of its greatest functions, however, is to teach the poorer classes how to make the most, as well as the best, of what they have. The exhibits were classified in sections, including those for elementary, household and artisan, army and navy, high-class, ornamental and decorative, and artistic cookery, and bread and pastry and shop goods. Each section had its particular interest; and the exhibits were attractively arranged, and did credit not only to the experienced *chef* but also to the school girl. Arrangements were made for lectures, demonstrations, and competitions. The most interesting feature of the exhibition, from our point of view, was the use of gas throughout for the competitions. It was not likely that the energetic Chief Inspector of the Gaslight and Coke Company (Mr. F. W. Goodenough) would allow such an opportunity to pass without demonstrating the convenience, cleanliness, and labour-saving property of gas; and accordingly the Company fitted up three model kitchens for the purpose. The first was suitable for a mansion, boarding-house, small restaurant, or hotel; the second was more adapted for a medium-sized house; while the third was suitable for an artisan's dwelling. It was the last that specially arrested attention, as it showed at a glance the liberal way in which the Company cater for the poorer class of the consumers—those using penny-in-the-slot meters, of which they have fixed nearly 200,000 in their district. In addition to the Gaslight and Coke Company, their neighbours, Messrs. William Sugg and Co., Limited, exhibited various kinds of stoves, including their gold medal gas-range "The Grand," with joint and pastry ovens, plate-warmer, grill, and hot-plate complete; while the Richmond Gas Stove and Meter Company, Limited, showed gas-cooking appliances and household requirements. The exhibition, which closed on Friday, attracted a large number of cooks, both amateur and professional; while the attendance of visitors generally was highly satisfactory—the lectures and demonstrations proving very attractive.

On the same day, there were opened simultaneously, at Hornsey, Crouch End, and Muswell Hill, under the auspices of the principal local firms of ironmongers, working in conjunction with the Hornsey Gas Company, exhibitions of gas appliances accompanied by cookery demonstrations. The centres are the National Hall, Hornsey, the Assembly Rooms, Crouch End, and the Athenæum, Muswell Hill; and at each of them are shown examples of gas cooking-stoves by all the leading makers. Special forms of lighting and heating by gas are also on view, and each centre has the latest novelties in domestic labour-saving as effected by gas, and cooking utensils especially adapted for gas cookers. Afternoon tea is provided every day, free of charge. Demonstrations in cookery are given daily at 3 p.m. and 7 p.m., by Miss Ada Ball, Mrs. A. M. Collins, and Miss Edith Lewis. On Friday last a five-course dinner was provided at each centre; and this will be repeated to-morrow and next Friday.

Particulars have reached us of some interesting cookery lectures and competitions for girls which have recently taken place at Yeovil, under the auspices of the Gas Committee of the Corporation, who gave prizes to the most successful competitors. High-class lectures occupied the afternoon, as is usual at an ordinary gas-stove exhibition; but the evening programme was varied. The first half-hour was devoted to the cooking of three plain dishes by the lecturer, who gave recipes and precise information for preparing them, and explained their position in the gas-stove, and gave directions for its management. This was followed by a competition for girls under the age of 18 (as a matter of fact, none were over, and few as much as, 14 years of age) on the dishes they had just seen. Each girl was provided with utensils, the requisite materials, and a Davis penny-in-the-slot gas-cooker. At the end, the dishes were exhibited on a table, each girl's work being grouped on an enamelled tray in a room at the side of the hall. As the visitors went out this way, they had every opportunity of inspecting the cookery and seeing who had won the prizes, after being judged by the lecturer, aided, on the first evening by the Chairman of the Gas Committee, and on the subsequent evenings by a young lady holding a Cookery Diploma. In awarding the prizes, which were of the value of 5s., 2s. 6d., and 1s. respectively for the first, second, and third, the judges gave special attention to good cookery—cleanliness first, neatness second, and speed last. They were of opinion that although speed is an important factor in gas-stove cookery, it can never be the most important, as it has been adjudged that an unappetizing dish produced in a hurry can never be a good advertisement for any stove. These competitions afforded two new attractions—first, that of the girls themselves and the teachers in the schools, the latter having undertaken to partially prepare the competitors, so that they were not entirely novices (cookery not being taught in the Yeovil schools, though it is hoped it

may be as one result of the demonstrations); secondly, the interest of the parents, who enthusiastically followed the work of their own and their friends' children. It is unquestionably the right course to train the young in the use and management of gas-stoves. Good results are sure to follow in a few years, as, having proved for themselves the great advantages of cooking by gas, they are not likely to wish to return to the coal-fire methods. No difficulty was found in getting girls to enter for the competition. It was arranged to deal with only twelve each evening; and all entries were speedily taken up. The large hall was almost filled with spectators each evening. The cookery itself was very well done, on the whole, and we learn that the awarding of the prizes was no sinecure. On the last night of the competitions the climax was reached—the hall being packed with people. After the cooking and judging, the Mayor (Mr. H. Stiby) distributed the prizes earned during the week, with congratulations to the girls and kind remarks and thanks to those who had assisted in the carrying out of the scheme. The Gas Manager (Mr. Edward Howell) responded, and expressed his satisfaction with the result of the undertaking. Several influential gentlemen were also present. The Chairmen of the Education and Gas Committees viewed with satisfaction the results of the efforts of the competitors in the dishes turned out, and the interest they displayed. The originator of the competitions was Mr. Howell, to whose untiring energy their success was due. In carrying them through, he had the assistance of Miss M. E. Betts. It may be hoped that other managers may see their way to follow his example, to the mutual advantage of the people who use the gas, those who supply it, and the gas-stove makers.

The exhibitions and demonstrations we have just noticed furnished additional proof, if any were needed, that gas holds an important place in modern homes. It was only right, therefore, that it should be in evidence at the International Building Trades Exhibition, held at the Agricultural Hall, Islington, from the 27th ult. till last Saturday. Taking lighting first, the James Keith and Blackman Company, Limited, had a very fine display of incandescent gas lighting, suitable for all classes of buildings; and they showed how their compressors are driven by water, electricity, or other motive power. Another fine piece of lighting was to be seen at the stand of Messrs. James Price and Son, where the entire exhibit was illuminated by the "Eagle" incandescent gas "arc" lamp. One of the special features of this lamp is the superheating chamber, by which, it is claimed, considerable efficiency is obtained. There are four burners, the whole or any number of which can be in use. It was stated that the lamps in operation over the stand were giving a light of 500-candle power with a consumption of 20 cubic feet of gas and using a 6 inch mantle. Certainly, they outshone the electric arc light in their immediate vicinity. A representative display of high-power and ordinary incandescent lamps, brackets, pendants, &c., was to be seen at the stand of Messrs. A. E. Podmore and Co.; and Messrs. James Stott and Co. showed how to govern the gas supply so as to effect economy. In the department of heating, the Carron Company had a highly attractive collection of stoves, gas-ranges, &c.; Messrs. Fenlon and Son showed their patent gas and oil "Tudor" geysers, "Unique" radiators, and "Temple" greenhouse heating apparatus. It is unnecessary at this time of day to dwell on the value of gas for the production of motive power, or to refer at any length to the exhibits of Messrs. Crossley Bros. and the National Gas-Engine Company; the character of the motors sent out by these firms being well known. Though it is a little foreign to the matters under notice, we must not leave the exhibition without mentioning that Messrs. Meldrum Bros., Limited, showed models of their patent regenerative refuse destructors, which are largely used in the United Kingdom and the Colonies, and their patent furnaces for steam-boilers. Altogether the exhibition was a very interesting one.

Gas Company Fined for Neglecting to Furnish Returns.—At Fareham, on Monday of last week, the Titchfield Gas Company were summoned at the instance of the Board of Trade for, while being a Company registered under the Companies' Act of 1862, failing to forward to the Chief Registrar the annual returns and summary for 1904. It was stated that the returns had been forwarded since the summons was issued. The Company were last year fined for a similar offence; and on the present occasion the Bench imposed a fine of £10, and ordered the Company to pay costs amounting to £4 11s.

Steam-Rollers and Fractured Pipes.—A letter was read at the last meeting of the Sidmouth Urban District Council complaining, on behalf of the Gas and Water Companies, of the use of the steam-roller on certain of the roads, and pointing out that if any of the Companies' pipes were broken, the Council would be liable. Mr. R. G. Pullin said that some of the service-pipes were laid at a depth of only 8 inches, and it was no wonder that the Gas Company did not desire a steam-roller to be used. Visitors wanted good roads, and to obtain them the roller must be employed. It was really at the suggestion of Mr. W. H. Hastings, the Secretary to the Gas Company, that a roller not exceeding 10 tons in weight was obtained. The Council decided to proceed with the rolling of the streets.

Yeovil Gas Supply.—The accounts of the Gas Department of the Yeovil Corporation for the year ended the 31st of March show that the revenue from the sale of gas for private lighting was £8708, and for public lighting £1032. Residuals produced £2338; and the total receipts were £12,960. The expenditure on manufacture was £6539; on distribution and management, £1052; and the total outlay was £8383—leaving a balance of £4577. Under the supervision of Mr. E. Howell, the Manager and Secretary, 5562 tons of coal were carbonized, and 58,420,000 cubic feet of gas produced. To ordinary consumers 40,862,000 cubic feet were sold; 10,831,400 cubic feet were used through prepayment meters; and 3,600,000 cubic feet were burnt in the public lamps. Owing to a reduction of 2½d. per 1000 cubic feet in the price of gas, the profits made last year were not quite sufficient to meet the liabilities.

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NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Edinburgh and Leith Gas Commissioners settled their coal contracts for the year on Monday. Provost Mackie, of Leith, who presided at the meeting, said they had, in Committee, agreed upon contracts for 67,000 tons of high-class cannel, and 113,000 tons of common coal. The price of the cannel was the same as last year. The average price was 6d. per ton higher; but this was because they had bought no second-class cannel this year—all being of the very highest quality in the market. The average price was 18s. 1d. per ton, delivered in the works. The common coal was of an average price of 8s. 9d. per ton, delivered, which was just the same as last year. The action of the Committee was approved. A year ago, the Commissioners purchased 201,000 tons of coal; being 84,000 tons of cannel and 117,000 tons of other coal.

The "Glasgow Herald" of Thursday last contains the following statement in its commercial columns: "Scotch gas corporations have been busily engaged of late in fixing up their contracts for coal supplies to carry them over the ensuing season; indeed, it is calculated—with the exception of Glasgow, which is also expected to buy this month—that about three-fourths of the country's requirements in this respect have been contracted for. The most important contracts placed of late have been those for Edinburgh, Paisley, Dundee, and Brechin, all of which have been able to secure supplies on pretty much the same terms as last year. Offers to Aberdeen, Dumfries, and a number of other places, are at present out, and are expected to be fixed within the next ten days or a fortnight. The Edinburgh Corporation have purchased about 180,000 tons. They have on this occasion taken only the best cannels, usually described as first class, with good coking results, the quantity taken being 70,000 tons, and at prices slightly in excess of last year's rates. At the opening of the season there was a disposition on the part of cannel coal producers to raise their prices by about 1s. per ton, in view of the resolution of the Glasgow Corporation to reduce the illuminating power of their gas; but ultimately the coalowners thought it advisable not to do so. Notwithstanding the attitude of the Glasgow Corporation, cannel coals are reported to have been freely taken off the market. The Edinburgh Corporation have also purchased about 110,000 tons of splint and coking coals, principally from the Lothians, at prices ranging from 8s. 6d. to 9s. per ton, delivered at the gas-works at Granton, or about the same prices as a year ago, to, in some cases, 1d. to 2d. per ton less. . . . It is understood that the Corporation have considerable balances of last year's contracts still to take up; so that, with the quantity just purchased, they have supplies contracted for which will provide for their requirements for the next fifteen months." The reasoning in the sentence beginning "At the opening of the season" appeared to me to be defective. I therefore consulted a gentleman who is well qualified to give an opinion upon the subject; and he tells me that it would be in accordance with fact if it were altered to read: "At the opening of the season there was a disposition on the part of cannel coal producers to raise their prices by about 1s. per ton; but, in view of the resolution of the Glasgow Corporation to reduce the illuminating power of their gas, ultimately the coalowners thought it advisable not to do so." Put this way, the situation is easily understandable.

The Edinburgh Town Council on Tuesday resumed consideration, broken off three weeks before, of the proposal of the Cleaning and Lighting Committee that 1950 of the existing flat-flame burners in street-lamps be converted into incandescent gas-lamps, at an initial cost of £4022, and an increased annual cost of £788. Mr. Stevenson, the Convener of the Electric Lighting Committee, moved that of the sum of £4022 for improved street lighting, £2000 be allocated for the purpose of providing 200 electric arc lamps in suitable thoroughfares. This motion was ruled to be out of order, on account of its not having been before the Cleaning and Lighting Committee. Mr. Stevenson then moved that the subject be recommitted. After some discussion, in the course of which there were two attempts to count out the Council, it was agreed to recommit the subject, in order that Mr. Stevenson might submit his proposals as to street lighting to the Committee. Thus the subject is again indefinitely postponed.

The Falkirk Town Council met in Committee on Tuesday to consider whether they should institute a prosecution against one of their employees for the theft of coal which should have been delivered at the gas-works. The coal is carted for a considerable distance; and it was found recently that some which left the railway station never reached the works. The Council deliberated in private, and, after considering a report by the police as to their investigations into the matter, they resolved to place it in the hands of the Procurator-Fiscal. On Thursday, the police arrested John Robb, a weigher; and he was yesterday taken before Sheriff Moffat and charged with having stolen 93 tons 4 cwt. of coal belonging to the Corporation. According to the Scotch form, he emitted a declaration with reference to the subject of the charge, and was committed to prison pending further inquiries.

The reduction last year in the price of the gas at Johnstone, from 2s. 8d. to 2s. 5d. per 1000 cubic feet, has, it is reported, had an encouraging effect upon the consumption. In the year which is just closing, the sale of gas has amounted to over 66 million cubic feet, which is 5 millions higher than has ever before been supplied in any year. When the Corporation acquired the gas undertaking in 1879, the make of gas was only 18 million cubic feet. The great increase of building on the outskirts of the burgh is having an effect on the demand for gas; and if the Linwood district be connected, it is anticipated that the increase will be still greater.

The Inverness Town Council had before them on Monday a report by the Manager of the gas undertaking—Mr. A. Thomson—on the supplies of coal and lime for the year. The total quantity of coal recommended was 8400 tons, and the cost was stated at—if carried

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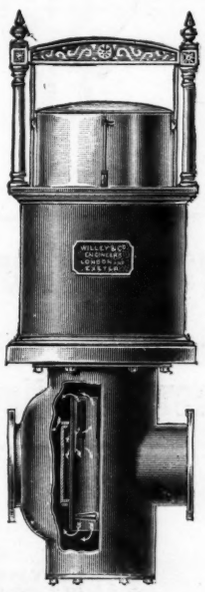

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by sea, £7227, which was equal to 17s. 2½d. per ton; if carried by rail, £7671, which was equal to 18s. 3d. per ton. The Manager was in favour of sea carriage. After some disussion, it was resolved to accept all the contracts recommended by Mr. Thomson.

The Corporation of Arbroath have succeeded, for the present, in preventing the intrusion of electric lighting. In 1899, to keep out an Electric Lighting Company, they applied for, and obtained, a Provisional Order empowering them to supply electricity within the burgh; but they have been in the reverse of a hurry to take up the powers contained in the Order. They applied for, and obtained, an extension of time, but still failed to proceed; and when they sought a further extension, it was refused them. This week they have received intimation from the Board of Trade that, the time having now elapsed for the carrying of the Order into effect, it has been cancelled, but that the expenses of the procedure under the Order, amounting to about £1500, will require to be arranged to be paid by the Town Council at an early date. How they are to raise the money to meet this impost it is difficult to say, because, even if the Corporation possess statutory powers to assess for it, the tax will be an exceedingly oppressive one upon an already heavily burdened community.

An important arbitration relating to the price to be paid for land acquired by the community of Prestonpans for their new water supply has just been decided by Mr. Wm. Allan Carter, of Edinburgh, who was appointed sole Arbiter in the case. In 1901, the County Council of Haddington obtained a Provisional Order authorizing them to acquire lands and lay pipes for bringing a supply of water from the Lammermoors to Prestonpans, Tranent, Cockenzie, and Port-Seton. The land to be acquired for the reservoirs was situated on the estate of Newtonhall, near Gifford, the property of Captain Hay Newton. Attempts were made by the County Council to settle the claims by private treaty; and a formal tender of £1260 was made to Captain Hay Newton for the land to be taken, along with an additional sum of £33 for way-leave for pipes. These tenders were declined by the proprietor, who indicated his willingness to accept a sum of between £1800 and £2000. The County Council decided that they would not increase their tender, and accordingly an arbitration was commenced. The claim lodged by Captain Hay Newton amounted to £3700. In the course of the arbitration, Captain Hay Newton's agent cited as precedents all the cases recently decided. The Arbiter has awarded the proprietor £2121, of which £5 is said to be a recognition of his right to the solium of the road.

Projected Water-Works Extension at Burnley.—The Water Committee submitted a recommendation at the last meeting of the Burnley Town Council that immediate steps should be taken to increase the storage capacity in connection with the water undertaking. The Council thereupon unanimously authorized the Committee to engage an Engineer to advise them as to the best means they could adopt for doing this.

CURRENT SALES OF GAS PRODUCTS.

Week ending May 6.

In London, the pitch market remains unaltered. Makers being well sold, maintain their quotation of 33s. for May-June, which figure has again been paid. For the period named (as well as forward delivery) there is considerable inquiry. Sixties crude carbolic is firmer; and 1s. 9¾d. net is obtainable for this and next month. Crystal carbolic is in good demand for prompt, and for the next three months; and improved prices are anticipated. Benzol is largely wanted for shipment; but nineties are a shade easier than last week—8¾d. net being about the value. The stocks of creosote oil are unimportant, and 1⅝d. would be readily paid; but makers decline to entertain less than 1¾d. in bulk. In anthracene, manufacturers are firm—especially on the reduced output—at 2d. to 2¼d. for first-class 40 per cent. makes; while buyers are willing to pay nearly this figure. Sulphate of ammonia continues in good demand for prompt and the next few months. For early delivery, the quotation was £2 16s. 3d. on Beckton terms.

Sulphate of Ammonia. LIVERPOOL, *May 6.*

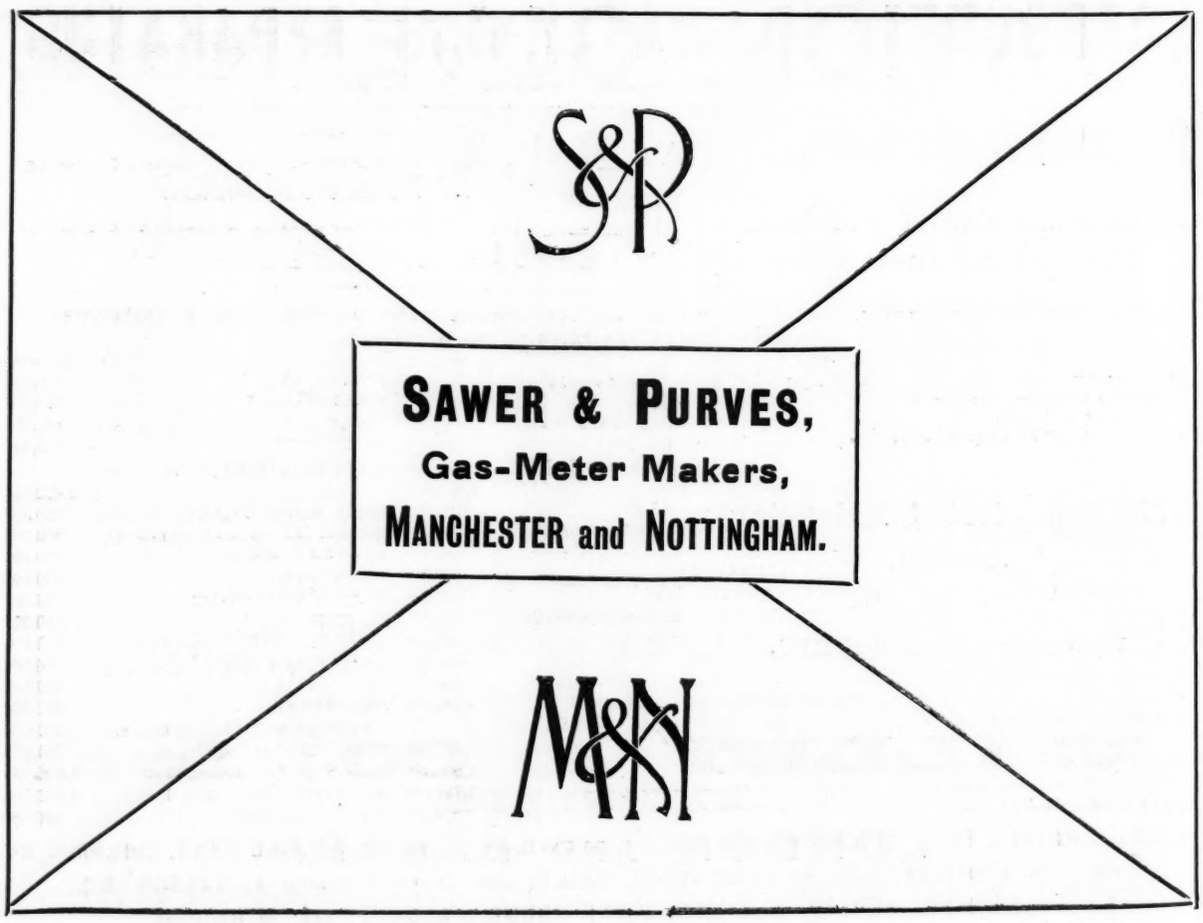
There has again been good demand for immediate and early delivery, and ready parcels have been easily absorbed at last week's prices, but requirements have not been sufficient to bring about an advance. The summer season is, however, being entered upon with bare stocks, and manufacturers seem to be in no hurry to make concessions for May-June delivery. The closing spot quotations are £12 10s. per ton f.o.b. Hull, £12 13s. 9d. per ton f.o.b. Liverpool, and £12 15s. per ton f.o.b. Leith. For June-September and for October-March there is good inquiry; but the views of buyers for the two periods, respectively, are not above £12 7s. 6d. and £12 3s. 9d. per ton, and in the meantime these prices are no attraction to manufacturers. Any business taken, therefore, has been taken speculatively.

Nitrate of Soda.

Notwithstanding the fixing of maximum shipments (provisionally) for April, 1905, to March, 1906, at 39 million quintals, the market remains firm in all positions. Local spot prices are 11s. 1½d. and 11s. 4½d. per cwt. for ordinary and refined qualities, respectively.

Tar Products. LONDON, *May 6.*

Business generally has been dull during the past week, with the exception of carbolic acid, in which the market has been quite excited. Early in the week some quantity was sold at 1s. 9½d., and 1s. 10d. was afterwards paid, at which price a big business is reported to have been done for July-December shipment. There is certainly a large inquiry for this article; and manufacturers hold off the market and decline to



offer except at about 2s., as there seems to be a considerable amount of uncertainty as to the future. Undoubtedly a very large quantity must have been sold during the past week, probably owing to a report that a lot of picric acid is being inquired for for both prompt and forward delivery. Crystals are also firmer, although there seems to be a wide range in the prices at which business has been done. Early in the week, some quantity of 39-40 per cent. is reported to have been placed at 6⅜d.; while later on sales were made at 6½d. The market closes with a fairly good demand. Makers as a rule ask 6½d. to 6⅝d., and in some instances even higher prices, for forward delivery. Benzol continues very quiet; and there is really no business doing either in London or the Provinces. There is perhaps a little more inquiry for 50-90 per cent., but the prices that are offered by consumers do not tempt makers to sell. The demand for toluol continues very good, and sales are reported in the North at 8d. for prompt; while makers do not seem inclined to offer. There is still a strong demand for the heavy gravities of solvent with a high flash-point; and prices seem likely to advance, as most makers appear to have cleared out their stocks of this quality. Ordinary 90 per cent., at 160°, is, however, still quiet, and there is no business to report. The position of anthracene remains unchanged, and no business appears to have taken place for either prompt or forward delivery. In creosote, business has again been done in Yorkshire at 1¼d. per gallon for both prompt and forward delivery; but so far as London is concerned there is nothing of importance to report. The largest producers are still firm in their ideas; while consumers do not seem at all desirous of purchasing, unless at lower prices than those at present ruling. In pitch, the market remains in precisely the same position, and there is really no business to advise. There are still inquiries in the market from South Wales for forward delivery; but makers do not seem disposed to sell at the prices offered by fuel makers, especially while so much uncertainty prevails as to the future of tar. In Belgium, very low prices are spoken of as being offered by consumers for both prompt and forward delivery; and the fuel trade is evidently dull in this district, owing to the difficulty in obtaining sufficient supplies of small coal. London distillers are sellers at 32s.; but dealers are not prepared to pay this price, and, in fact, do not seem inclined to buy just at present. Considerable weakness still prevails in the Manchester and Liverpool district; but there is no business of importance to report.

The average values during the week were: Tar, 17s. 6d. to 21s. 6d. Pitch, London, 31s. to 31s. 6d.; east coast, 30s.; west coast, 28s. to 28s. 6d. Benzol, 90 per cent., 8½d.; 50-90 per cent., 7½d. to 8d. Toluol, 8d. Crude naphtha, 3d.; solvent naphtha, 8d. to 8½d.; heavy naphtha, 10d. to 10½d. Creosote, London, 1 5/16d. to 1⅝d.; North, 1¼d. Heavy oils, 2d. to 2 1/16d. Carbolic acid, 60 per cent., 1s. 9⅜d. to 1s. 10d. Refined naphthalene, £4 to £8; salts, 12s. to 14s. Anthracene, "A" quality, 1½d. to 1⅝d.; "B" quality, unsaleable.

Sulphate of Ammonia.

The market has been fairly steady during the week, and there appears to be a slightly improved demand for shipment in the early part of May. Beckton ask £12 16s. 3d., but would probably accept £12 15s. for delivery during May; while the South Metropolitan still quote £13, although it is reported that they accepted £12 17s. 6d. during the latter part of last week. In Leith, good business is reported at £12 15s.—in fact, some makers ask £12 16s. 3d. for early shipment. Hull is quiet; but business has been done for May shipment at £12 10s., Liverpool. The market is very firm, there being evidently a strong demand for shipment to Spanish ports; and £12 13s. 9d. is reported to have been paid in more than one instance.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The Manchester coal market possesses no special features of interest. Some municipal coal contracts with local collieries have been concluded within the last few days on the basis of those which obtained last year, and which are expected to prevail during the season. The Salford Corporation have accepted tenders for the ensuing twelve months. There is little doing in house and furnace coal; but for engine fuel the demand continues satisfactory. Prices are well maintained at the advance made in February; and although nothing has at present been arranged, there may be further alterations within the next month or two. There is no change in the price of cannel. Competition from other districts tends to preserve present rates.

Northern Coal Trade.

There is now a steadier demand for coal, the opening of the trade to the northern ports having given a stimulus to several branches of coal mining—enough, at least, to compensate for the falling off of the demand for household fuel, and for gas coal for the home trade. In the steam coal trade, the demand is stronger; but work cannot yet be considered to be full at all the collieries. Best Northumbrian steams are 9s. 4d. to 9s. 6d. per ton f.o.b.; for second-class steams the quotation is now from 8s. to 8s. 6d. per ton, and steam smalls are relatively scarce and firm at from 4s. 6d. to 5s. 6d. Gas coals are steady; for though there is a lessened demand from the great users at home, the exports are increasing, and fair, though not full, time is worked at collieries. Durham gas coals are from 7s. 9d. to 8s. 3d. per ton, generally f.o.b.; but for one or two kinds a higher price is asked. Small contracts are now being renewed at much about the rates that prevailed under the previous contracts. Gas coke is steadier—the smaller production, and some enlargement of the exports, steadying prices; but there is rather a difficulty in giving the current price with accuracy.

Scotch Coal Trade.

There is a better request for the higher qualities of splint, and of ell for shipment. Otherwise the market is quiet; and it cannot be said that the prospect is much improved generally. The prices quoted

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

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W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

London Offices: 19 ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
BLACKBURN	1,250,000	ST. CATHERINES (Remodelled)	250,000	TONBRIDGE	300,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	STRETFORD	500,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	OLDBURY	300,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	TODMORDEN	500,000
BIRKENHEAD	2,250,000	ST. CATHERINES (2nd Cont.)	250,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	YORK (Second Contract)	750,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	ROCHESTER (Second Contract)	500,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	NEWPORT (MON.)	250,000
HALIFAX	1,000,000	YORK	750,000	TOKIO, JAPAN	1,000,000
TORONTO	250,000	ROCHESTER	500,000	PERNAMBUCO (Brazil)	125,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	MALTON	150,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	DULUTH, MINN. (2nd Cont.)	300,000
MONTREAL	500,000	DULUTH, MINN.	300,000	BROCKVILLE (ONT.)	250,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	SMETHWICK	500,000
BELLEVILLE	250,000	LEICESTER	2,000,000	GRAVESEND	300,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	NEWPORT MON. (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	TORONTO (Third Contract)	750,000
		BURNLEY	1,500,000	TORONTO (Fourth Contract)	1,000,000
		KINGSTON-ON-THAMES	1,750,000	MONTREAL, ONT. (2nd Cont.)	1,800,000
		ACCRINGTON	500,000	HAMILTON, ONT.	400,000

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft

AND IN ADDITION, 7,900,000 CUBIC FEET DAILY; also Coal-Gas Plants at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND, CALGARY, and WINNIPEG.

are: Main 7s. 3d. to 7s. 6d. per ton f.o.b. Glasgow, ell 8s. 3d. to 9s., and splint 8s. 3d. to 8s. 9d. The shipments for the week amounted to 235,763 tons—a decrease of 23,332 tons upon the previous week, and of 29,319 tons upon the corresponding week of last year. For the year to date, the total shipments have been 3,658,250 tons—an increase of 273,606 tons upon the corresponding period of 1904.

TRADE NOTES.

Biggs, Wall, and Co.'s New Contracts.

Messrs. Biggs, Wall, and Co. have secured the contract for the erection of one bed of regenerator-fired retorts for the Ringwood Gas Company. We learn that the firm are introducing a new type of regenerator setting which is not known on this side of the Tweed, though it has been extensively adopted in Scotland, where the results are stated to have proved in the highest degree satisfactory. The firm have also secured the contract for a solid plate lead saturator for the Weymouth Gas Company, and an 8-ton complete ammonia-concentrating plant for the Dunedin (N.Z.) Corporation Gas Department.

Blakeley's Construction Work Contracts.

Messrs. J. Firth Blakeley and Co., of Thornhill, Dewsbury, have lately secured two important contracts. One is for the Downpatrick County Asylum, consisting of three beds of regenerative retorts, with ironwork complete, one set of condensers, tower scrubber, two purifiers, and steel tank and gasholder; the tank being 31 ft. 6 in. diameter and 12 ft. 3 in. deep, with all fittings, &c., in connection therewith. The Easingwold Gas Company have also placed an order with them for a 45-feet diameter gasholder, with cup for telescoping at a future date, together with a steel tank, standards, &c., complete. Also for one of their improved combined gas-engines and exhausters, and a station governor, delivered and erected complete.

The Condition of the Cleveland Water Supply.—It was stated in a recent "JOURNAL" that there was some hope that the rain which had lately fallen would substantially improve the outlook with regard to the water supply of the Cleveland district. It will be remembered that notices were issued by the Water Company that unless rain fell meanwhile the supply to manufacturers and for mining purposes would be curtailed at the end of April; but fortunately the Engineer and Secretary of the Company (Mr. William I'Anson) has since been in a position to issue a circular suspending the operation of this notice for a period of nineteen days. Since the original notice was sent out on the 12th ult., the rainfall has measured just over an inch.

Finances of the Manchester Water Department.—The payments made by the Manchester Corporation Water Department during the year to March 31 (including the balance due to the bankers at the beginning, £139,799) amounted to £488,559. The total liabilities at the end of the month amounted to £193,817, and the assets to £112,984, leaving the deficiency at £80,833. The Committee expect that this deficiency may increase to £100,000 by the end of the current year; but, on the other hand, they look forward to larger sales, and to benefit by the lessened expenditure on capital account.

Paignton Water-Works Loan.—At the meeting of Paignton Urban District Council yesterday week, reference was made to the decision of the Local Government Board in connection with the proposed additional loan of £41,000 for the completion of the new water-works. Mr. Ham, the Chairman of the Water Committee, pointed out that the term allowed for the repayment of the original loan of £70,000 was 60 years; but for the supplemental loan to complete the same work the Board proposed to allow only 30 years. This would add very largely to the burdens of the ratepayers, and would mean an increase of 3½d. in the rates. The Committee strongly recommended that a deputation should be sent to the Board with a view to getting the period extended. Several members thought there was very little chance of success, and considered it would be a waste of money to send a deputation to London. Mr. Puddicombe, however, suggested that the Board had overlooked the fact that the period allowed by the Council's Water Act was 60 years, and that a great deal of the work for which the loan was sanctioned was for extras on the original estimate. It was decided that the Chairman of the Water Committee, with the Chairman of the Finance Committee and the Clerk, should wait on the Local Government Board.

Collapse of a Reservoir at Madrid.—A few weeks ago, news reached England of a shocking fatality at Madrid, resulting from the collapse of a partially constructed reservoir, which caused the loss of more than 200 lives. It was the third reservoir intended for use in connection with the water supply of the city, and was being built in underground vaults, one of which gave way. According to the "Builder," the immediate cause of the disaster appears to have been the bending and rupture of the columns supporting the roof. But our contemporary says there are some very ugly facts in the background. As long ago as 1901, a partial collapse took place, and the Minister of Public Works was warned that, owing to the insecure character of the subsoil, the reservoir would never be able to withstand the pressure of the water intended to be stored in it. Again, in 1903, complaints were made as to the inferior quality of the cement supplied; and about the end of March this year several deep cracks appeared in the masonry. The authorities were at last aroused to some sense of danger, with the result that the construction was subjected to severe tests during the first week in April. These tests seem to have given the death-blow to the faulty structure, though the Government engineers thought they demonstrated its perfect safety.

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NEW CONVEYOR CO., LTD., SMETHWICK.

Stafford Corporation Water Supply.—According to the annual report of the Water Committee of the Stafford Corporation, the gross profit on the working in the past financial year was £2968. After meeting the capital charges and providing £250 for the reserve fund, the net profit was £629, of which £600 has been transferred to the district fund in relief of the rates. The quantity of water raised from the well during the year was 209½ million gallons—an increase of 18½ million gallons.

Thefts from Prepayment Meters in Unoccupied Houses.—At Scarborough two women have been sentenced to six weeks' imprisonment for robbing prepayment gas-meters. The method adopted by the prisoners was to obtain the keys from the landlords of houses vacated by tenants, saying that they wished to look over them. At ten houses the meters had been forced open and money in them stolen, ranging from 3d. to 5s. Seven or eight door-keys were found upon the women, who admitted sharing the proceeds of the thefts.

"As a Going Concern."—Mr. R. C. Davies, a member of the Southwark Borough Council, has given notice that at the next meeting he will move a resolution "to sell the electric light undertaking as a going concern in view of its heavy cost to the ratepayers." There was a little trouble at the last meeting arising out of a pertinent inquiry as to what was the loss on the electric light undertaking. But the Progressives preferred keeping the information in the dark—excusing themselves on the ground that the Council are opposing certain Bills in Parliament, and therefore it was not advisable to publish what was desired.

Coal Contracts at Stockport.—The Stockport Town Council have had a long discussion with regard to the coal contracts for the gas-works; the question being whether these should be for one or two years. The Chairman of the Gas Committee (Alderman Clarke) was in favour of two years, on the ground that present prices were very low, and were likely soon to be increased. Mr. Fernley, however, moved an amendment that the contracts should be for one year; urging that the acceptance of present terms for a longer period would be a pure speculation, which they ought not to indulge in on behalf of the ratepayers. This was the view taken by the Council, for the amendment was carried by thirty votes to four.

Quality of the Llanelly Gas.—At the last meeting of the Llanelly Urban District Council, attention was called to the petition of the largest gas consumers (*ante*, p. 326) urging the Council to take proceedings against the Company whenever the gas was below the standard. Mr. Guest said he really could not understand why the Roads Committee had not made some recommendation; and he moved, under the circumstances, that the matter be referred back to them. The Chairman said that, in view of a case pending between the Company and a consumer, they were urged not to take any action for the present. Mr. Bramwell Jones moved that the Council should proceed against the Company for supplying gas under the standard; but ultimately the matter was referred back to the Committee.

Sunderland and South Shields Water Bill.—The Town Clerk of Sunderland has received a letter from Messrs. Longden, Mann, and Longden, the Solicitors to the Sunderland and South Shields Water Company, stating that, in consequence of the strong feeling against water-softening in the manner proposed, and the questionable advantages to be derived therefrom, the Company have resolved to abandon their Bill. They added, however, that if the Corporation were disposed to accept the concessions originally offered them by the Company as a condition of withdrawing their opposition, the Company would be willing to reconsider the question. In reply, the Town Clerk has written informing the Solicitors that this proposal has been unanimously rejected by the Authorities concerned, "as being too ridiculous to be seriously entertained." Apparently therefore the Bill is at an end.

A Small Increase in Consumption at Carnarvon.—In submitting his annual report on the gas-works to the Carnarvon Town Council, the Accountant said that the most astounding feature was the fact that there had been only an increase of 252,000 cubic feet in the sale of gas to private consumers during the year ending March. It was the smallest increase ever recorded. The advent of electricity might account for 70,000 cubic feet; and another like quantity was explained by the fact that the collection from the slot meters had been made a little earlier than usual. There had been a decrease of 1·68 per cent. in the leakage, which he considered satisfactory. During the year the cost of maintaining the works had been very heavy. Past experience would lead them to expect a very great saving in the matter of maintenance in the future; but as far as the present year was concerned, an adverse balance would probably have to be met unless the greatest economy was exercised. The result of the year's working was a net profit of £217, or a decrease of £351 compared with the previous year.

Manchester Water Supply.—In submitting the report and accounts of the Manchester Water Committee for the past year to the City Council, Sir Bosdin T. Leech pointed out that there was a deficiency of £27,833, the reason of which was that the Committee had followed the policy of accumulating deficiencies when they had large works in hand. The estimated deficiency was £26,576, and to this £1257 was added during the year—owing partly to the restricted income on account of the drought and partly to an increase in rates of interest. The same policy of accumulating deficiencies would be followed in the coming year; but now that the second Thirlmere pipe had been completed, they hoped in the near future to work off the arrears. The Committee had felt considerably the effect of the increased rates of interest which they had now to pay for loans; the average rate at the present time being 11s. 4d. per cent. more than it was six years ago. This alone represented an additional payment in interest during the period of £39,000. Works to improve still further the quality of the water supplied to the city from Longdendale had been executed, costing upwards of £38,000. Besides these, the interest and sinking fund on the capital expended on the second line of pipes from Thirlmere (which had not yet become productive) amounted to £51,000. The Committee desired to avoid, if possible, the reimposition of rates and charges taken off in 1899; and they were not without hope that an increased demand for water would enable them to meet their liabilities in a very short time.

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Kimberley Water-Works Company, Limited.—The report of the Directors of this Company for the past year shows, after providing £4621 for debenture interest and £1002 for depreciation, a net profit, including £1474 interest on investments, of £25,942. Out of this sum the Directors propose to write off £9000 from construction, to transfer £1192 to the investment fluctuation reserve, and to pay a dividend of 5 per cent. for the year, absorbing £15,750.

Southport Corporation Gas Supply.—The Borough Treasurer of Southport (Mr. G. Lloyd), in his annual statement to the Finance Committee of the Corporation, says that the position of the Gas Committee at the end of the financial year was very gratifying. The gross profit was £23,989, compared with £22,337 last year; the increased gross profit being £1652. After paying last year an additional sum of £1250 in aid of rates, there is a balance in hand of £1640, out of which the Committee propose to take £1500 in aid of the rates for the year ending March 31, 1906; leaving £140 to be carried forward.

Plymouth Gas Company and the Municipal Electricity Works.—The Electricity Committee of the Plymouth Town Council have received from Messrs. Shelly and Johns, Solicitors to the Plymouth and Stonehouse Gas Company, a letter stating that reports have reached their clients to the effect that the Corporation were selling, or were negotiating for the supply of, electric power under the actual cost price of making it; and intimating that if the Corporation conducted their business in this way, the Company must strenuously oppose any application for raising further money for the electrical works. The Committee resolved to inform Messrs. Shelly and Johns that, so far as they were aware, the reports referred to were not in accordance with facts, and that if the Gas Company had any information in their possession bearing on the subject of their complaint the Committee would be glad to be furnished with it.

Winsford Gas Supply.—At a special meeting of the new District Council at Winsford, estimates in connection with the gas undertaking were considered. The expenditure for the year to March 31, 1906, was estimated at £3766, including £1375 for gas manufacture, and £1357 in respect of loans. The receipts were expected to be £4605, including £280 for gas for the public lamps. After providing for improvements, the balance at the end of the year was anticipated to be £570. The Manager (Mr. F. Sidwell) said 2 million cubic feet more gas had been sold during the year than in 1903-4; yet the make had only been half-a-million cubic feet more. This was due to there having been less leakage. It was decided to reduce the price of gas for lighting purposes from 3s. 9d. to 3s. 6d.; for motive power from 3s. 5d. to 2s. 8d.; and for cooking purposes from 3s. 4d. to 3s. 1d. When the Local Authority acquired the works four years ago, the price of gas for lighting purposes was 4s. 7d. per 1000 cubic feet. A new member of the Council remarked that he should not be satisfied until they had the Widnes price of gas at Winsford.

Mr. R. A. Browning and the Pontardawe Gas-Works.—Some discussion has taken place in the Neath Town Council with reference to the undertaking of outside duties by the Gas Manager, Mr. R. A. Browning. Mr. Phillips pointed out that under an agreement dated August, 1903, when an increase of salary was granted, it was stipulated that Mr. Browning should devote the whole of his time to the service of the Corporation. He moved that the Manager be requested to adhere to the agreement; and, failing this, that the question of his salary should be reconsidered. In a written communication, Mr. Browning said he promised not to do any outside work, by which he understood that he was not to accept any consulting practice; and this he had faithfully adhered to. He had been connected with the Pontardawe Gas-Works for the past twelve years; and this was known to the Council, who made no objection. He added that negotiations were pending for the sale of the works, and that he had never received a farthing for his services as Managing-Director. Mr. Phillips ultimately withdrew his resolution for three months, to enable Mr. Browning to comply with the terms of the agreement.

Mr. Matt. Dunn recently lectured on "Coal and its Formation, and Particularly its Use for the Manufacture of Gas," at the Masonic Hall, Stockton-on-Tees.

An order for retort-house extensions at the Enfield Gas-Works has been placed with Messrs. Ashmore, Benson, Pease, and Co., Limited. The extensions have been designed by Messrs. Valon and Son.

The Gas Committee of the Southport Corporation have decided to accept the tender of Messrs. Edward Wood and Co., Limited, for the supply and erection of the roof and ironwork for the new retort-house for £1397.

The quantity of water employed last year for washing streets and courts in the City of London was 50,238,433 gallons; and it was used on 298 nights. The Corporation paid £4249 for water, compared with £4121 in 1903.

A Company having the title of the Gaseous Steam Generator, Limited, has been registered with a capital of £20,000, in £1 shares, to acquire, work, and deal with patent or other rights, properties, concessions, and interests, and to carry on the business indicated by the title.

The Cannon Iron Foundries, Limited, have secured the contracts for the supply of gas-stoves, extending over a stipulated period of years, for the Rhyl Urban District Council, the Milford Haven Urban District Council, and the Chepstow Gas Company. These are in addition to many important gas undertakings they have already contracted with.

Mr. William A. Tookey, author of the Handbooks entitled "Gas-Engines: Their Advantages, Action, and Application;" "Oil-Engines: Their Selection, Erection, and Correction;" and "Gas-Producers for Power Purposes," has just established himself at No. 29, Old Queen Street, S.W., to undertake tests, to examine and report upon existing steam, gas, or oil engines, &c., and generally to give advice upon the selection, erection, and correction of power-producing machinery of all types.

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WANTED, FOR SALE, CONTRACT, &c. ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

MANAGER, &c. Ennis Gas Company.
MANAGER. Carrick-on-Suir Gas-Works.
WORKING MANAGER. No. 4388.
SALESMAN FOR SHOW ROOMS. Bath Gas Company. Applications by May 23.
GENERAL FOREMAN. Bradford-on-Avon Gas Company. Applications by May 15.
GAS-FITTER. No. 4389.

Situations Wanted.

ASSISTANT MANAGER OR SUPERINTENDENT. No. 4390.
GAS-FITTER, &c. Gibson, Wellingborough.

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CONDENSER. Redditch Gas Company.
"JOURNAL" VOLUMES. No. 4387.
WASHER-SCRUBBER AND CONNECTIONS, &c. Rawmarsh Gas Department.

Plant, &c., Wanted.

BOILER. Biggs, Wall, and Co., Finsbury.
PURIFIER. Cahir Gas Company.

Stocks and Shares.

BRISTOL GAS COMPANY. June 8.
BRIXHAM GAS COMPANY. May 13.
BRUCE PEEBLES & Co. (new Issue). May 12.
CHIGWELL, LOUGHTON, AND WOODFORD GAS COMPANY. May 16.
FELIXSTOWE GAS COMPANY. May 16.
LOWESTOFT WATER AND GAS COMPANY. May 16.
SOUTHEND WATER COMPANY. May 16.
TENDRING HUNDRED WATER COMPANY. May 23.
ILFORD GAS COMPANY. May 23.
WANDSWORTH AND PUTNEY GAS COMPANY. May 16.
WOKINGHAM WATER COMPANY. May 16.

TENDERS FOR

Benzol.

DARWEN GAS DEPARTMENT. Tenders by May 27.
LEIGH CORPORATION. Tenders by May 13.
WALSALL GAS DEPARTMENT. Tenders by May 27.

Bricks and Flags.

LEEDS GAS DEPARTMENT. Tenders by May 22.

Coal and Cannel.

BALLINA GAS COMPANY.
BANGOR GAS DEPARTMENT. Tenders by May 30.
BARNSTAPLE GAS COMPANY. Tenders by May 13.
BARROW-IN-FURNESS GAS DEPARTMENT. Tenders by May 24.
BRIDGNORTH GAS DEPARTMENT. Tenders by May 15.
CANTERBURY GAS AND WATER COMPANY. Tenders by May 30.
CHIPPENHAM GAS COMPANY. Tenders by May 24.
DRONFIELD GAS COMPANY. Tenders by May 30.
GLOUCESTER GASLIGHT COMPANY. Tenders by May 27.
HONLEY GAS DEPARTMENT. Tenders by May 18.
KING'S LYNN GAS COMPANY. Tenders by May 17.
LEIGH CORPORATION. Tenders by May 13.
LLANDUDNO GAS DEPARTMENT. Tenders by June 2.
MANSFIELD GAS DEPARTMENT. Tenders by May 29.
MONTROSE GASLIGHT COMPANY. Tenders by May 20.
OLDHAM GAS DEPARTMENT. Tenders by May 16.
PADIHAM GAS DEPARTMENT. Tenders by May 23.
RICHMOND TOWN COUNCIL. Tenders by May 29.
SKIPTON GAS DEPARTMENT. Tenders by May 27.
SOWERBY BRIDGE GAS DEPARTMENT. Tenders by May 29.
TIVERTON GAS DEPARTMENT. Tenders by June 4.
TORQUAY GAS DEPARTMENT. Tenders by May 23.
WALSALL GAS DEPARTMENT. Tenders by May 27.

Creosote (Benzolized).

WALSALL GAS DEPARTMENT. Tenders by May 27.

Creosote Oil.

LEIGH CORPORATION. Tenders by May 13.

Lead Piping (Gas and Water).

LEIGH CORPORATION. Tenders by May 13.

Lime.

BIRKENHEAD GAS DEPARTMENT. Tenders by May 18.
LEEDS GAS DEPARTMENT. Tenders by May 22.
LEIGH CORPORATION. Tenders by May 13.
WALSALL GAS DEPARTMENT. Tenders by May 27.

Meter (Station).

ROCHDALE GAS DEPARTMENT. Tenders by May 17.

Oil for Gas Making.

BARROW-IN-FURNESS GAS DEPARTMENT. Tenders by May 24.

Pipes and Specials.

BARKING GAS COMPANY. Tenders by May 22.
DARWEN GAS DEPARTMENT. Tenders by May 27.
LEEDS GAS DEPARTMENT. Tenders by May 22.
LEIGH CORPORATION. Tenders by May 13.

Pipe Laying.

SHEPPY GAS COMPANY. Tenders by May 24.

Pitch.

LEIGH CORPORATION. Tenders by May 13.

Purifier (New or Second Hand).

CAHIR GAS COMPANY.

Purifiers, &c.

COVENTRY GAS DEPARTMENT. Tenders by May 15.

Sulphate Plant.

MILLOM GAS DEPARTMENT. Tenders by May 24.

Sulphuric Acid.

LEIGH CORPORATION. Tenders by May 13.

Tar and Liquor.

DARWEN GAS DEPARTMENT. Tenders by May 27.
EXMOUTH GAS COMPANY. Tenders by May 23.
HONLEY GAS DEPARTMENT. Tenders by May 18.
LEIGH CORPORATION. Tenders by May 13.
MANSFIELD GAS DEPARTMENT. Tenders by May 29.

Well Sinking, &c.

BARNET GAS AND WATER COMPANY. Tenders by June 2.

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PALMERSTON HOUSE, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO, LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

BROTHERTON & CO., LIMITED.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

SULPHATE OF AMMONIA
SATURATORS and all LEAD and TIMPER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams: SATURATORS, BOLTON. Telephone 0848.

PATENTS AND TRADE MARKS
PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

"NUGEPE" GAS PLANT CEMENT.
JOHN E. WILLIAMS AND CO.,
LOWER MOSS LANE,
MANCHESTER, S.W.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 254 Oldham, and 2412 HOP, London.
Telegrams:—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

DUTCH OXIDE OF IRON.
SPENT OXIDE PURCHASED IN ANY DISTRICT.

THE First Dutch Bogore Co., Ltd., HOLLAND.
General Manager (for England and Wales)—
CHARLES E. FRY, LEAMINGTON.
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

BIGGS, WALL, & CO., 13, Cross Street, Finsbury, E.C. *Telegrams:* "RAGOUT," LONDON. *Telephone:* 273 CENTRAL.
SULPHATE PLANTS—See Advt. in last week's issue.
CHARGING MACHINERY—See Advt. in this week's issue.
SATURATORS—See Advt. in next week's issue.

THE KEITH LIGHT.
OVER 1600 INSTALLATIONS IN DAILY USE.
SEE illustrated advertisement in next week's issue.
JAMES KEITH AND BLACKMAN CO., LTD., 27, Farringdon Avenue, LONDON, E.C.

SPENT OXIDE.
THE South Metropolitan Gas Company are always open to receive OFFERS of SPENT OXIDE.
Chief Office: 709, Old Kent Road, London, S.E.
Telegrams: "METROGAS, LONDON."

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

GLASS SHADES of every description, for all kinds of Interior **GAS LIGHTING.** Illustrated sheets on application.
JOHN WALSH WALSH,
SOHO AND VESTA GLASS WORKS, BIRMINGHAM.
Telegrams: "VESTA, BIRMINGHAM."
National Telephone: No. 63.
London Show-Room: 4, HOLBORN CIRCUS, E.C.

OXIDE OF IRON.
(NATURAL.)
BALE & CHURCH will be pleased to send Quotations and Samples on application.
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT for all Retort and Furnace work.
PAINT for Gasholders, Purifiers, &c.
5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.
SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER, CHAPMAN, AND MESSEL, LIMITED, 86, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341, AVENUE.

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

GASHOLDER PAINTING.
PAINTING Work for all kinds of Gas-Works Plant undertaken by contract or otherwise.
FREDERICK BOYALL, 31, Regent's Row, Queen's Road, DALSTON, N.E. Established 1850.

YOUNG Man wants situation as Gas-FITTER. Five Years' Experience at Gas-Works. Used to Iron and Compo. Had considerable Experience in Slot Installations, Incandescents, &c. Age 21.
Address J. W. GIBSON, Gas Cottages, London Road, Wellingborough, NORTHANTS.

ENGINEER.
A WELL-QUALIFIED and Competent Engineer requires Situation as ASSISTANT MANAGER or SUPERINTENDENT of Gas-Works, or would manage small works. Has had excellent Training and Experience in all departments of Manufacture. For some years has been Superintendent of Works of 3 Millions daily capacity; is a very good Draughtsman; and able to prepare Designs for Alterations, Extensions, Machinery, &c. First-Class References and excellent Testimonials would be supplied.
Address, No. 4390, care of Mr. King, 11, Bolt Court FLEET STREET, E.C.

WANTED, by a Suburban Gas Company, an Experienced FITTER of good address, with knowledge and up-to-date Experience of Lighting and other Burners, and of Gas Appliances generally.
Applicants to send *copies* only of recent Testimonials, and to state Age and Wages required, to No. 4389, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ROBERT DEMPSTER & SONS, Ltd., Contractor for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

WANTED, on Aug. 1, 1905, a thoroughly Competent and Experienced WORKING MANAGER for a Gas-Works in small Town in Midlands. Salary £150. A House is provided at the Works, with Coal and Gas.

Replies, stating Age and Experience, with not less than three recent Testimonials, to be sent before the 23rd of May to No. 4388, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Ennis Gas Consumers Company, Limited, require the services of a man as MANAGER and GAS-FITTER. Must be a good Carbonizer and understand Regenerative Furnaces and Gas-Engine and Exhauster, and be Experienced in Main and Service Laying and Gas-Fitting. Married man preferred. Salary 30s. per week. House, Fuel, and Light free.

Send Two recent Testimonials with Application to the SECRETARY, Gas-Works, Ennis, Co. CLARE.

CARRICK-ON-SUIR GAS-WORKS, IRELAND.

MAKE ABOUT 5 MILLION CUBIC FEET PER ANNUM.

MANAGER Wanted, immediately. Wages to start 35s. weekly, with Free House, Garden, Light, and Firing.

Apply, in own hand-writing, stating Age, Family and concise Particulars of Experience, and enclosing *copies* of two recent Testimonials, to R. BRUCE ANDERSON, 5, Westminster Chambers, Victoria Street, LONDON, S.W.

THE Bath Gaslight and Coke Company are about to open new Show-Rooms in the City, and will require the services of an Energetic, Properly-Qualified SALESMAN, with good knowledge of the most Modern and Approved Methods of using Gas for Lighting, Heating, Cooking, &c.

Applications, stating Age, Experience, &c., Salary required, and enclosing *copies* of three Testimonials, to be sent in by the 23rd inst.

C. STAFFORD ELLERY,
Manager.

BRADFORD-ON-AVON GAS COMPANY.

CARBONIZING AND WORKS FOREMAN.

WANTED, immediately, an Experienced and Reliable Man as GENERAL CARBONIZING and WORKS FOREMAN. Thoroughly steady and accustomed to Retort Setting, the charge of Purifiers, Scrubbers, Pipes, and Valves, Laying of Mains and Service Pipes, interior Fittings, and Fixing of Meters. He would have the Entire Charge of the Works. Wages 35s. per week, with House, Garden, Coal, and Gas Free.

Apply, with References, stating previous Experience and Age, not later than May 15, 1905, to

G. SUMMERS,
Secretary.

Gas-Works,
Bradford-on-Avon, Wilts.

A GENTLEMAN with many Years Business Experience seeks an INVESTMENT in either Brewery, Gas, Water, Railway, or Tramway Company, where a large holding in Preference or Debenture Shares would secure a seat on the Board of Direction.

Write "GENUINE," care of Gould's Advertising Agency, 54, NEW OXFORD STREET, W.C.

PURIFIERS Wanted, 12 feet and 20 feet. Square Boxes. Must be Good and Cheap.
FIRTH BLAKELEY, Thornhill, DEWSBURY.

CAHIR GAS COMPANY, LIMITED.

TWO Purifiers, with Connections, required, New or Second Hand, about 10 ft. by 5 ft.

For Particulars, apply to R. BRUCE ANDERSON, Assoc.M.Inst.C.E., 5, Westminster Chambers, Victoria Street, LONDON, S.W.

WANTED, a Second-Hand Cornish or Lancashire BOILER, 24 ft. long by 7 ft. diameter, complete with all Mountings. A slightly smaller Boiler will be considered.

Apply to BIGGS, WALL, & Co., 13, Cross Street, Finsbury, LONDON, E.C.

NEW Gasholder, 40 ft. diameter by 12 ft. deep, with Steel Standards; also new STEEL TANK to contain same.

Write J. WRIGHT, 181, Queen Victoria Street, LONDON, E.C.

REDDITCH GAS COMPANY.

CONDENSER for Sale (water cooled), faced joints. First-Class Condition. Capacity 250,000 per day.

Particulars, &c., from A. E. LAYTON, Manager.

FOR DISPOSAL—Bound Volumes of the "JOURNAL OF GAS LIGHTING," 1886-1902. Complete and in good condition.

Apply, by letter, to No. 4387, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters. Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.

J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

TEST PLANT FOR SALE—We have several small Sets of GAS APPARATUS suitable for Test Plants, including Retorts, Condensers, Scrubber, Purifiers, Gasholders, overhauled and guaranteed, or New throughout.

FIRTH BLAKELEY AND Co., Thornhill, DEWSBURY.

PURIFIERS, &c., FOR SALE—Sets of 4 ft., 5 ft., 6 ft., 8 ft., 9 ft., 10 ft., 12 ft., 18 ft. squares; also 16 ft. by 12 ft., &c. SCRUBBERS, 8 ft. by 60 ft. 10 inch, 18 inch Square METERS. EXHAUSTERS up to 50,000 feet per hour in Stock. GASHOLDERS and TANKS, also New. State requirements

FIRTH BLAKELEY AND Co., Thornhill, DEWSBURY.

RAWMARSH URBAN DISTRICT COUNCIL.

THE Gas Committee have for Sale a Kirkham, Hulett, and Chandler "Standard" WASHER-SCRUBBER, with 10-inch Valves, Connections, &c., capable of passing 200,000 cubic feet per day. It is being replaced by a larger one, and can be seen working at the Gas-Works, Parkgate, Rotherham.

For further Particulars, apply to E. O. WATSON, Gas Manager.

SHEPPY GAS COMPANY.

THE Directors of the above Company are prepared to receive TENDERS for laying about 7000 Yards of 10-inch diameter and 8-inch diameter Cast-Iron GAS-MAINS.

Full Particulars may be obtained at this Office on and after the 10th of May, 1905, on deposit of 21s., which will not be returned except on receipt of a *bonâ-fide* Tender.

Tenders to be addressed to the Chairman of the Sheppy Gas Company, Sheerness-on-Sea, Kent, endorsed "Tenders for Mainlaying," and must be delivered not later than the 24th day of May, 1905.

The Sheppy Gas Company do not bind themselves to accept the lowest or any Tender.

H. BARBER,
Secretary and Manager.

Offices: 2, Trinity Road,
Sheerness-on-Sea.

BOROUGH OF LEIGH.

(GAS DEPARTMENT.)

THE Gas and Water Committee of the above Corporation invite OFFERS for the surplus TAR made at their Gas-Works during the Twelve Months ending June 30, 1906. The Corporation are also prepared to receive TENDERS for the supply and delivery of PITCH and CREOSOTE OIL during the same period.

Further Particulars, together with Conditions of Contract and Forms of Tender, may be obtained on application to the undersigned.

Sealed and endorsed Tenders must be delivered to Mr. Stanley Wilson, Town Clerk, Town Hall, Leigh, Lancashire, on or before Twelve o'clock noon on Saturday, the 13th day of May next.

The Corporation do not bind themselves to accept the highest Tender for Tar, or the lowest for Pitch and Oil, or any Tender, and reserve to themselves the right to divide any Tender.

JAMES GIBSON,
Engineer and Manager.

Gas and Water Offices,
Leigh, Lancs.

BOROUGH OF LEIGH.

(GAS AND WATER DEPARTMENT.)

THE Gas and Water Committee of the above Corporation are prepared to receive TENDERS for the supply of the following GOODS:—

1.—12,000 Tons of Screened and Unscreened Gas Coal, Nuts, and Slack.
2.—Lead Piping (Gas and Water).
3.—Vitriol.
4.—Lime.
5.—Benzol.
6.—3-inch, 4-inch, and 7-inch Cast-Iron Pipes and Specials.

Forms of Tender may be had on application from the undersigned, to whom all Inquiries must be addressed; and all Offers must be made on the Official Forms, or they will not be considered.

Sealed and endorsed Tenders must be delivered to Mr. Stanley Wilson, Town Clerk, Town Hall, Leigh, Lancashire, on or before Twelve o'clock noon on Saturday, the 13th day of May next.

The Corporation do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right to divide any Tender.

JAMES GIBSON,
Engineer and Manager.

Gas and Water Offices,
Leigh, April 25, 1905.

GLOUCESTER GASLIGHT COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the above Company invite TENDERS for the supply of about 33,000 Tons of GAS COAL for One Year from the 1st day of July next, in such monthly quantities as may be required by the Company.

Tenders to state the price delivered at the Midland Railway Sidings, Hempstead, near Gloucester, or the Great Western Railway Wharf, Llanthony, Gloucester; or if sent (as preferred) by Water, the price f.o.b., and also the price delivered at the Gas Company's Wharf on the Gloucester and Berkeley Canal.

Further Particulars and Forms of Tender may be obtained of the undersigned.

Sealed Tenders, endorsed "Tender for Coal," specifying the description and quality of the Coal, to be addressed to the Chairman, Gas Offices, Eastgate Street, Gloucester, and delivered not later than Saturday, the 27th inst.

The Directors reserve to themselves the right to accept the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any Tender.

By order,
WILLIAM E. VINSON,
Secretary.

Gas Offices, Gloucester,
May 1, 1905.

BARNSTAPLE GAS COMPANY.

TENDERS FOR COAL.

THE Directors invite Tenders for the supply of about 4000 Tons of best screened GAS COAL, to be delivered at Fremington Quay or Barnstaple Station, as required, during the Year ending the 30th of June, 1906.

Tenders to be sent to the undersigned not later than Saturday, the 13th inst.

The lowest or any Tender not necessarily accepted.

No Special Form of Tender.

F. L. SCHOFIELD,
Secretary and Manager.

15, Cross Street, Barnstaple,
May 1, 1905.

LEEDS CORPORATION GAS-WORKS.

THE Gas Committee are prepared to receive TENDERS for the supply of about 11,000 Tons of Craven or Derbyshire LIME, required for the Purification of Gas at the several Gas-Works, during the Twelve Months commencing on the 1st of July, 1905.

Forms of Tender may be had on application to the undersigned.

Tenders, addressed to the Chairman of the Gas Committee, and endorsed "Lime," must be delivered at the Gas Offices, East Parade, Leeds, on or before Monday, the 22nd inst.

The Committee do not bind themselves to accept the lowest or any Tender.

R. H. TOWNSLEY,
General Manager.

Gas Offices, East Parade,
Leeds, May 6, 1905.

LEEDS CORPORATION GAS-WORKS.

TENDERS required as follows:—

For WROUGHT-IRON TUBES.
For PRESSED and COMMON RED BRICKS.
For 2½-inch, 3-inch, and 4-inch Self-Faced Bradford or Halifax FLAGS.

Forms of Tender may be had on application to the undersigned.

Endorsed Tenders, addressed to the Chairman of the Gas Committee, must be delivered at the Gas Offices, East Parade, Leeds, not later than Monday, the 22nd inst.

The Committee do not bind themselves to accept the lowest or any Tender.

R. H. TOWNSLEY,
General Manager.

Gas Offices, East Parade,
Leeds, May 6, 1905.

TO LIME MASTERS.

THE Corporation of Walsall invite TENDERS for the supply of about 1000 Tons of LIME, which will be required at their Gas-Works during One Year from the 1st of July next; the deliveries to be in such monthly quantities as the Manager of the Gas-Works may from time to time direct.

The Lime is to be hand-picked, and clear from Refuse and Ashes, and to be delivered at the Corporation siding at the Pleck Gas-Works as required.

The Corporation will not accept the Tender of any person or firm paying less than the Standard rate of wages to their workmen.

Payments monthly.

Tenders, sealed and marked outside "Tender for Lime," are to be sent to the undersigned on or before Saturday, the 27th of May inst.

JOHN R. COOPER,
Town Clerk.

Borough Offices, Walsall,
May 1, 1905.

BOROUGH OF WALSALL.

TENDERS FOR GAS COAL.

THE Corporation of Walsall invite TENDERS for the supply of 25,000 Tons of good Screened GAS COAL and 20,000 Tons of Screened GAS NUTS, to be delivered during One Year from the 1st of July next, at the Corporation siding at the Pleck Gas-Works, Walsall, as may be required.

Forms of Tender and Specification may be obtained on application to the undersigned.

The Corporation do not bind themselves to accept any Tender, and they reserve the right to divide the Contract between several firms.

Tenders, sealed and marked outside "Tender for Gas Coal," and stating the price for large Coal, and also for Nuts, are to be sent to the undersigned on or before Saturday, the 27th of May inst.

JOHN R. COOPER,
Town Clerk.

Borough Offices, Walsall,
May 1, 1905.

BOROUGH OF WALSALL.

TENDERS FOR BENZOL AND FOR BENZOLIZED CREOSOTE.

THE Corporation of Walsall invite TENDERS for about 6000 Gallons of 90 per cent. BENZOL for enriching purposes; and also TENDERS for about 2500 Gallons of BENZOLIZED CREOSOTE, free from Naphthalene, to be delivered during One Year from the 1st of July next, in drums or in casks, to the Corporation sidings at the Pleck Gas-Works, Walsall.

Further Particulars may be obtained from the Engineer at the Pleck Gas-Works, Walsall.

The Corporation do not bind themselves to accept any Tender, and they reserve the right to divide the Contract between several firms.

The Corporation will not accept the Tender of any person or firm paying less than the Standard rate of wages to their workmen.

Tenders, sealed and marked outside "Tender for Benzol" or "Tender for Benzolized Creosote," are to be sent to the undersigned not later than Saturday, the 27th of May inst.

When Tendering for the Benzol, the amount of purity should be stated.

JOHN R. COOPER,
Town Clerk.

Borough Offices, Walsall,
May 1, 1905.

Filed with the Registrar of Joint Stock Companies in Scotland.

The Subscription List will open on Wednesday, 10th May, 1905, and close on or before Friday, 12th May, 1905.

BRUCE PEEBLES & CO., LD.

(Incorporated under the Companies Acts, 1862 to 1900)

ENGINEERS.

Electrical Department - EAST PILTON, EDINBURGH.
Gas Department - TAY WORKS, EDINBURGH.

CAPITAL - - £300,000

DIVIDED INTO

30,000 Six per cent. Cumulative Preference Shares of £5 each - - - - £150,000

Of which 20,000 Shares have been issued and are fully paid. The Preference Shares participate with the Ordinary Shares as stated below.

30,000 Ordinary Shares of £5 each - - £150,000

Of which 20,000 Shares have been issued and are fully paid.

£300,000

BY THE MEMORANDUM OF ASSOCIATION IT IS PROVIDED:

(1) That the Preference Shares be entitled to a Cumulative Preferential Dividend at the rate of 6 per cent. per annum of the Capital paid up thereon.

(2) That at least 10 per cent. of the annual net profits (before paying the said Preferential Dividend) shall be put to a Special Reserve Fund, to be invested outside the Business until such Fund amounts to £25,000, at which figure it is to be maintained.

(3) That in any year in respect of which a Dividend in excess of 6 per cent. shall be paid on the Ordinary shares, the Preference Shares shall be paid such a Dividend as will (including the fixed Dividend) raise their Dividend for that year to the same Dividend as that paid on the Ordinary Shares, but not exceeding 7½ per cent.

(4) That, in a winding-up, the Preference Share Capital be paid off in priority to the Ordinary Share Capital, and after the Ordinary Shares have been paid off, the Preference Shares shall participate in the distribution of any surplus assets equally with the Ordinary Shares, but so that not more than a sum equal to 25 per cent. on the Capital paid up on each Preference Share shall be paid.

ISSUE OF THE BALANCE of 10,000 Six per cent. Cumulative Preference Shares of £5 each at par; 10,000 Ordinary Shares of £5 each at par. Payable—On Application, £1 per Share; on Allotment, £2 per Share; on 30th June, 1905, £2 per Share; Total £5 per Share.

This issue of Preference Shares will carry dividend at 6 per cent. per annum on the amounts paid up from the due dates of the instalments, and will also be entitled to receive a proportion of any additional dividend for the year 1905. Thereafter they will be identical with the Preference Shares already quoted in London and Edinburgh.

Directors:

WILLIAM CARMICHAEL PEEBLES, Hope Lodge, Trinity, Edinburgh, Engineer,
ARTHUR CHARLESWORTH PEEBLES, Hope Lodge, Trinity, Edinburgh, Engineer,
ROLAND SYDNEY PORTHEIM, 25, Victoria Street, London, S.W., Engineer,
MONTAGUE TABOR PICKSTONE, 60, Princes Street, Edinburgh, Engineer,
Joint Managing Directors.
HENRY MUNGALL, 20 Royal Terrace, Edinburgh, Coalmaster.
ANDREW WILSON TAIT, Basildon House, London, E.C., Chartered Accountant.

Bankers:

ROYAL BANK OF SCOTLAND, Edinburgh, Glasgow, London, and Branches.

Solicitors:

DAVIDSON & SYME, W.S., 28, Charlotte Square, Edinburgh.

Auditors:

ROBERTSON & CARPHIN, C.A., Edinburgh and Glasgow.

Brokers:

LAURIE, MILBANK, & Co., 31, Threadneedle Street, London, E.C.
H. GILMOUR & SHAW, 18, St. Andrew Square, Edinburgh.

Secretary and Offices:

JOHN REID PEEBLES, East Pilton, Edinburgh.

PROSPECTUS.

The Company was formed in 1903 to acquire and carry on the business of D. BRUCE PEEBLES & Co., Engineers, established in 1866.

In 1904 the Electrical Department was transferred to new Works at East Pilton, Edinburgh, which have been erected in the most modern style, and equipped with the latest specialized plant, so that the Company is in a position to manufacture a large output under satisfactory and economical conditions.

The amount spent on the New Works, including machinery and plant, to December 31, 1904, was over £93,000; and the very rapid progress and expansion of the Company's business have rendered further Working Capital necessary. All the proceeds of the present issue will be applied to that purpose.

The manufactures include Electrical Plant for Lighting and Tramway Corporations, Power Companies, and Industrial Works of every description, and the Company has on its books the most important users of Electrical Plant both in this country and in the Colonies. Amongst these may be mentioned—

H.M. Admiralty.
H.M. War Office.
H.M. Colonial Office.
H.M. India Office.
Imperial Japanese Naval Dockyard, Tokio.
Great Western Railway.
Great Northern Railway.
South-Eastern and Chatham Railway.
Midland Railway.
Pretoria and Central African Railway.
Natal and Durban Railways.
Indian State Railways.
Bengal and Nagpur Railway.
North Wales Power and Traction Co., Ltd.
Canadian Electric Traction Co., Ltd.
Sunderland District Electric Tramways.
Fife Electric Power Co., Dunfermline.
Scottish Central Power Co., Bonnybridge.
Falkirk and District Electric Tramways.
Durham Collieries Electric Power Supply Co.
South Wales Electrical Power Distribution Co.
Durham County Electrical Supply Co., Ltd.
British Electric Traction Co.
Vickers, Sons, and Maxim.
Chadwick's Thread Works.
Ogden's Tobacco Factory.
Carron Iron Works.
Laird Brothers & Co.
Fairfield Shipbuilding Co.
Denny Brothers.
Consett Collieries.
United National Collieries.
Powell Duffryn Colliery.
Fife Coal Co.
Etc. Etc.

MUNICIPAL STATIONS.

Aberdeen.	Buxton.	Glasgow.	Paisley.	Stoke Newington.
Adelaide	Cardiff.	Kelvinside.	Partick.	Stowmarket.
Ayr.	Carlisle.	Leith.	Perth.	Swansea.
Barnsley.	Darwen.	Manchester.	Peterborough.	Todmorden.
Barrow.	Dewsbury.	Maybank.	Poplar.	Warrington.
Bradford.	Doncaster.	Merthyr.	Rochdale.	West Ham.
Brighton.	Exeter.	Nelson.	Southampton.	West Kent.
Bristol.	Garston.	Newcastle.	Southend.	Worcester.

The orders now on the Company's books considerably exceed those at the same date last year.

The books have been regularly audited by Messrs. Robertson and Carphin, Chartered Accountants, who have given the under-mentioned Certificate of Profits—

AUDITORS' CERTIFICATE

29, STAFFORD STREET,
EDINBURGH, 1st May, 1905.

As Auditors of the late firm of Messrs. D. Bruce Peebles and Co. and of their successors, Messrs. Bruce Peebles and Co., Ltd., we certify that the Profits of the business for the five years ending 31st December, 1904, were as follows:—

For the year ending 31st December, 1900	of the Firm	£9,719 10 0
,, ,, ,, 1901		13,917 17 2
,, ,, ,, 1902		13,436 7 9
,, ,, ,, 1903	of the Company	13,988 12 5
,, ,, ,, 1904		*28,792 7 6

The results for the first three years were arrived at after providing for all working expenses, including Partners' and Managers' salaries, repairs, renewals of Tools and Machinery, and depreciation at the rate of 5 per cent. per annum on the book value of the Working Plant, but without deducting Interest on Capital and Loans or Income Tax paid on profits; and for the last two years they were arrived at after providing for all working expenses, &c., and depreciation on Plant and Machinery, Directors' Fees, Managing Directors' Salaries, and Income Tax, and for the year 1904, Interest on Debentures and the expense connected with the removal of the Electrical Department to the Works at East Pilton.

ROBERTSON AND CARPHIN, C.A.

* While the Limited Company took over the business as at 31st December, 1902, the new Capital was not received till after the allotment on the 4th July, 1903, at which time the new works were only in course of construction; consequently, it was not until 1904 that the fresh Capital became productive in the new works, and this is reflected in the profits of 1904. As indicated in the Auditors' Certificate, the whole expenses of removal to the new works were charged against the profits of that year.

The Assets and Liabilities of the Company, other than Share Capital, at 31st December, 1904, were as follows:—

1. Buildings—New Works at East Pilton		£43,827	0 0
2. Working Plant, Machinery, Tools, Trade Fixtures, Office Furniture, &c.		67,754	9 3
3. Stock, Stores, Work in Progress, and Finished Work		63,119	2 5
4. Debts due to the Company—			
(*a*) Book Debts	£69,776 9 11		
(*b*) Current Contracts, &c., Value of Work done, *less* amount received to account of same	82,385 11 10		
		152,162	1 9
5. Cash in Bank and on hand		18,655	6 11
6. Debentures and Shares in Power and Traction Companies		17,370	0 0
7. Special Reserve Fund Investment		1,197	1 0
		£364,085	1 4
8. Patents, Trade Marks and Trade Names, and Goodwill		26,536	9 7
		£390,621	10 11
Deduct Liabilities—			
(1) Debentures Issued and Accrued Interest	£50,739 14 6		
(2) Sundry Creditors	119,823 4 5		
		170,562	18 11
BALANCE, being excess of Assets over Liabilities		£220,058	12 0

The Capital already issued is £200,000, divided into 20,000 Preference Shares of £5 each and 20,000 Ordinary Shares of £5 each. The whole of these Preference Shares and 3000 of these Ordinary Shares were offered and issued to the public, and have been fully paid. The remaining 17,000 Ordinary Shares were issued to the Vendors as fully paid in part payment of the purchase price.

After the completion of the New Works the Directors had an independent valuation of the Company's property made by Messrs. Wheatley Kirk, Price, & Co., and the Balance Sheet for 1904 was framed on their valuation. Had the Book Values been taken the Profit for 1904 would have been greater than above stated.

VALUERS' CERTIFICATE.

We, the undersigned, having been appointed to value all and several The Feu Land, Buildings, and Railways, Electric Light and Power Installations, Steam, Water, Fire, Compressed Air, Gas, Heating, Electric Bell and Telephone Services, Plant and Machinery, Trade Fixtures, Loose Tools, Office Furniture and Fittings at Works, also at the London, Newcastle, Manchester, and Cardiff Offices; Stock and Stores and Work in Progress in, upon, and belonging to the Works Premises situate at East Pilton, in the Parish of Cramond, in the County of Edinburgh; and also at the Works Premises known as the Tay Works, situate in the burgh of Leith, in the County of Edinburgh, and being the property of Messrs. Bruce Peebles & Co., Ltd., Electrical and Gas Engineers;

This is to certify that we have carefully examined and valued the aforesaid items, taken as a Current Going Concern, as and upon the Thirty-first day of December, One thousand nine hundred and four;

And we hereby declare the sum of One hundred and seventy thousand four hundred and fifty-four pounds fourteen shillings and tenpence to be, in our opinion, the fair value thereof (exclusive of Goodwill).

WITNESS our hands this first day of March, One thousand nine hundred and five

WHEATLEY KIRK, PRICE & Co., *Valuers,*
London and Manchester.

£170,454 14s. 10d.

NOTE.—With regard to the items of Stock, Stores, and Work in progress, we assume no responsibility for the quantities or weights, but have every reason to believe they are accurate.

Since the formation of the Company, dividends of 6 per cent. have been paid on the Preference and Ordinary Shares. A sum of £6000 has been written off Preliminary Expenses, and the Reserve Funds set aside out of Profits now are:—

(1) Preference Shareholders' Special Reserve	£4,079 4 9
(2) General Reserve	8,000 0 0
Together	£12,079 4 9

The Balance of Profits carried forward on December 31, 1904, was £3854 6s. 0d.

In compliance with the Companies Act, 1900, it is necessary to refer to the undermentioned Contracts disclosed in the previous Prospectus:—

Agreement, dated 24th June, 1903, between (1) John Logie Robertson, W.S., Edinburgh, William Carmichael Peebles, Arthur Charlesworth Peebles, and John Reid Peebles, all residing at Hope Lodge, Trinity, Edinburgh; and William Robertson, F.F.A., Edinburgh, Testamentary Trustees of the late David Bruce Peebles, Edinburgh; and (2) the said William Carmichael Peebles, as an individual—the said Trustees and William Carmichael Peebles being the sole partners of D. Bruce Peebles and Co., Engineers, Edinburgh, with consent and concurrence of Montague Tabor Pickstone, Roland Sydney Portheim, and Arthur Charlesworth Peebles, of the first part, and the Company, of the second part, for the sale to the Company of the Business of D. Bruce Peebles and Co.

Agreement, dated 24th June, 1903, entered into between the Company and William Carmichael Peebles, Arthur Charlesworth Peebles, Roland Sydney Portheim, and Montague Tabor Pickstone—providing for the appointment of these gentlemen as Managing Directors.

Agreement, dated 24th day of June, 1903, between the Company and The London Trust Company, Limited, 37, Lombard Street, E.C., relating to the issue and subscription of the Preference and Ordinary Shares offered to the public on the formation of the Company.

In addition to the above, the following material Contracts have been entered into:—

1. Agreement and Declaration of Trust, dated 17th August, 1904, between the Company and the Trustees, Executors, and Securities Insurance Corporation, Limited, Winchester House, Old Broad Street, London, relative to the issue of the said Debentures.

2. Agreement, dated 26th and 28th April, 1905, between the Company and Laurie, Milbank, & Co., 31, Threadneedle Street, London, whereby, in consideration of an underwriting commission of 4 per cent. and an overriding brokerage of 1 per cent., the said Laurie, Milbank, and Co. undertake that the present issue of Preference Shares will be subscribed.

The Company will pay a brokerage of 1s. per share on allotments in respect of applications, other than underwriters', bearing a broker's stamp.

Extension of Stock Exchange quotations to include these Preference Shares will be applied for in London and Edinburgh.

Applications should be made on the Forms accompanying the Prospectus, and sent to the Bankers, accompanied by a cheque for the amount payable on Application. Amounts paid in respect of Applications for which no allotment is made will be returned in full to the Applicants.

Copies of the Memorandum and Articles of Association, and of the above-mentioned Contracts, and the Auditors' and Valuers' Certificates, may be seen during the usual business hours at the Office of the Solicitors to the Company, 28, Charlotte Square, Edinburgh.

East Pilton, Edinburgh, 5th May, 1905.

BOROUGH OF DARWEN.

THE Gas Committee of the above Corporation are prepared to receive TENDERS for the supply of the following Goods for One Year:—

BENZOL.
WROUGHT-IRON TUBES and FITTINGS.
CAST-IRON MAINS and SPECIALS.

Full Particulars and Forms of Tender may be obtained on application to Mr. A. H. Smith, Gas Engineer, Darwen.

Sealed and endorsed Tenders must be delivered to the undersigned not later than Saturday, the 27th of May, 1905.

The lowest or any Tender not necessarily accepted.

By order,
WILLIAM P. HALLIWELL,
Town Clerk.

Town Clerk's Office,
Darwen, May 2, 1905.

BOROUGH OF DARWEN.

TENDERS FOR TAR.

THE Gas Committee of the above Corporation are prepared to receive TENDERS for all the surplus TAR produced at their Gas-Works for One Year.

Further Particulars and Forms of Tender may be obtained on application to Mr. A. H. Smith, Gas Engineer, Darwen.

Sealed Tenders, endorsed "Tender for Tar," must be delivered to the undersigned not later than Saturday, the 27th of May, 1905.

The highest or any Tender not necessarily accepted.

By order,
WILLIAM P. HALLIWELL,
Town Clerk.

Town Clerk's Office,
Darwen, May 2, 1905.

BOROUGH OF BARROW-IN-FURNESS.

SUPPLY OF COAL AND CANNEL.

THE Corporation are prepared to receive TENDERS, on Forms to be obtained at the Office of the Gas and Water Manager, for the supply of screened GAS COAL and CANNEL for the Year ending the 30th of June, 1906.

Tenders, addressed to the Chairman of the Gas and Water Committee and endorsed "Tender for Coal," to be delivered at the Town Clerk's Office, not later than Twelve o'clock noon on Wednesday, the 24th day of May, 1905.

The lowest or any Tender not necessarily accepted.

By order,
C. F. PRESTON,
Town Clerk.

Town Hall, Barrow-in-Furness.

BOROUGH OF BARROW-IN-FURNESS.

SUPPLY OF GAS OIL.

THE Corporation are prepared to receive TENDERS for the supply of about 300 to 400 Tons of OIL, suitable for the Manufacture of Carburetted Water Gas, delivered free at the Gas-Works Siding, in such quantities and at such times as may be required during the period ending the 30th of June, 1906.

Sealed Tenders, addressed to the Chairman of the Gas and Water Committee and endorsed "Tender for Oil," to be delivered at the Town Clerk's Office, not later than Twelve o'clock noon on Wednesday, the 24th of May, 1905.

The lowest or any Tender not necessarily accepted.

By order,
C. F. PRESTON,
Town Clerk.

Town Hall, Barrow-in-Furness.

SKIPTON URBAN DISTRICT COUNCIL.

TENDERS FOR GAS COAL.

THE Council invite Tenders for the Supply of about 7000 Tons of Best GAS COAL (Screened, Unscreened, and Nuts), to be delivered free at the Railway Station, Skipton, or at the Council's Wharf adjoining the Gas-Works in Skipton, on the Leeds and Liverpool Canal, between June 30, 1905, and July 1, 1906, in monthly quantities.

Full Particulars as to Periods and Quantities of Deliveries, &c., and Form of Tender, may be obtained from the Manager (Mr. J. H. Woodward, Gas-Works, Skipton), and Tenders, endorsed "Tender for Coal," are to be sent to the Chairman of the Gas Committee, Gas-Works, Skipton, on or before Saturday, May 27, 1905.

The lowest or any Tender not necessarily accepted.

RICHARD WILSON,
Clerk to the Council.

May 5, 1905.

TO LIME MERCHANTS.

THE Corporation of Birkenhead are prepared to receive TENDERS for the supply of 1000 Tons or thereabouts of LIME for Gas Purifying, delivered free into their Gas-Works as required during the Twelve Months ending on the 30th of June, 1906, and as directed by the Gas Engineer, Mr. T. O. Paterson, from whom Forms of Tender and all Particulars may be obtained.

Tenders, sealed and endorsed "Tender for Lime," to be sent in to me not later than 5 p.m. on Thursday, the 18th of May, 1905.

The person whose tender may be accepted will be required to enter into a Contract containing a clause as to the payment of the rate of wages, and the observance of the hours of labour, recognized and agreed upon between the Trades Unions and the employers in the locality in which the work for carrying out the Contract is to be performed.

The Corporation do not bind themselves to accept the lowest or any tender.

By order,
ALFRED GILL,
Town Clerk.

Town Hall, Birkenhead,
May 6, 1905.

MILLOM URBAN DISTRICT COUNCIL.

TENDERS are invited for the Supply and Erection at the Millom Gas-Works of a SULPHATE OF AMMONIA PLANT capable of dealing with 10 Tons of Liquor per Twenty-four hours.

The Council will provide the Building, Foundations, Brick Purifier, Overhead Liquor Storage Tank, and make all Connections.

Persons tendering must submit their own Designs of Apparatus, with full detail Specification; but the work must be carried out according to the Council's general Specification, copies of which will be supplied on application.

The lowest or any Tender not necessarily accepted.

Plans, &c., with Tenders, endorsed "Sulphate Plant," to be sent to me not later than the 24th of May inst.

W. T. LAWRENCE,
Clerk to the Council.

Council Offices, Millom,
May 5, 1905.

BARNET DISTRICT GAS AND WATER COMPANY.

TENDERS are required for Sinking a WELL and Driving ADITS at Northaw, in Hertfordshire, for the Barnet District Gas and Water Company, in accordance with plans and Specifications which can be seen at the Company's Offices, New Barnet.

Further Particulars can be obtained of the Company's Engineer and Manager, Mr. T. H. Martin, Assoc. M.Inst.C.E., and copies of the Plans and Specifications will be supplied on payment of One Guinea, to be returned on receipt of a *bona fide* Tender.

Sealed Tenders to be sent in on or before Ten a.m. on Friday, June 2, 1905, addressed to the Chairman of the Company, 30, Gracechurch Street, London, E.C.

The Directors do not bind themselves to accept the lowest or any Tender.

T. H. MARTIN, Assoc. M.Inst.C.E.,
Engineer and Manager.

Station Road, New Barnet,
May 5, 1905.

BOROUGH OF TIVERTON.

TENDERS FOR COAL.

THE Lighting Committee are prepared to receive TENDERS for the whole or part of about 2800 Tons of screened GAS COAL or best NUTS (state if washed or otherwise) of the following descriptions—viz., New Pelton, Aldwarke Main, Rothervale, Barrow, Yorkshire Silkstone, Strafford Silkstone, Wharncliffe Silkstone, and Mirfield, to be delivered at the Railway Siding, adjoining their Gas-Works at Tiverton during One Year.

Further Particulars and Form of Tender (which must be used) may be obtained on application to the Manager, Gas-Works, Tiverton.

Sealed Tenders, endorsed "Tenders for Gas Coal," and addressed to the undersigned, must be received on or before the 4th day of June next.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
C. M. HOLE,
Town Clerk.

Tiverton, May 5, 1905.

SOWERBY BRIDGE URBAN DISTRICT COUNCIL.

TENDERS FOR COAL AND CANNEL.

THE Gas Committee are prepared to receive TENDERS for the supply and delivery of 14,000 Tons of best screened GAS COALS and 1200 Tons of best CANNEL COALS, or such quantities as may be required for the Gas-Works at Sowerby Bridge and Luddenden Foot during the period of Twelve Months from the 1st of June, 1905, to the 31st of May, 1906.

Tenders will be received for the whole or any portion of the above quantity.

Specifications, Forms of Tender, and all Information can be obtained on application to the Engineer, Mr. A. W. Bissell, Gas-Works, Sowerby Bridge.

The Gas Committee reserve the right to accept Tenders for the whole or any portion of the quantity offered, and do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, endorsed "Tender for Coal" or "Cannel," to be delivered not later than Twelve noon on Monday, the the 29th of May, 1905, to

R. W. EVANS,
Solicitor and Clerk to the Council.

Commercial Bank Chambers,
Halifax, May 8, 1905.

MANSFIELD CORPORATION.
(GAS DEPARTMENT.)

TENDERS FOR GAS COAL AND CANNEL.
TENDERS FOR TAR AND AMMONIACAL LIQUOR.

COAL.

THE Gas Committee are prepared to receive TENDERS for 1500 Tons of CANNEL and 10,000 Tons of best screened GAS COAL, delivered at Mansfield Station for One Year from the 1st of June, 1905, to the 31st of May, 1906.

TAR AND LIQUOR.

TENDERS for surplus TAR and LIQUOR made from the 1st of June, 1905, to the 31st of May, 1906. Tenders for Liquor to be made either at a fixed price per Ton or on the Sliding-Scale regulated by the price of Sulphate.

Tenders, endorsed "Coals" or "Tar and Liquor," as the case may be, to be sent to J. Harrop White, Esq., Town Clerk, Mansfield, on or before the 29th of May, 1905.

Particulars and all other Information from the undersigned.

NOTE: No Special Form of Tender provided.

The Committee do not bind themselves to accept the lowest or any Tender.

ARTHUR GRAHAM,
Engineer and Manager.

Gas-Works, Mansfield,
May 5, 1905.

KING'S LYNN GAS COMPANY.

THE above Company invite Quotations for the Supply of 6500 tons of GAS COAL; to be delivered (*a*) f.o.b. the Company's Steamers in the Tyne or elsewhere, or (*b*) f.o.r. Harbour Siding, King's Lynn, during the year ending June 30, 1906.

Quotations, endorsed "Coal," to be sent to the undersigned on or before the 17th inst.

The Company do not issue Tender Forms.

EDMUND G. SMITHARD,
Manager.

Gas-Works, King's Lynn,
May 6, 1905.

CANTERBURY GAS AND WATER COMPANY.

TENDERS FOR GAS COAL.

TENDERS are invited for the supply of 14,500 Tons of the best GAS COALS, to be delivered during One Year commencing on the 1st of July next.

Forms of Tender, containing Particulars and Conditions of the Contract, may be obtained on application to the undersigned.

Sealed Tenders, endorsed Coals, to be delivered at the Company's Offices, Castle Street, Canterbury, on or before Saturday, the 30th of May inst.

By order,
JAMES BURCH,
Secretary and General Manager.

May 1, 1905.

TENDER FOR COAL.

THE Urban District Council of Bangor, Co. Down, invite TENDERS for supplying about 3000 Tons of best double-screened GAS COAL, to be delivered into Carts at Bangor Quay, at such times and in such quantities as may be required from June 1 next. Parties Tendering to name the Pit from which the Coal offered is raised.

Tenders should be accompanied by Analyses placed in sealed envelopes, marked "Tender for Coal," and must reach me not later than Tuesday, May 30 next.

No Tender Forms issued.

The Council do not bind themselves to accept the lowest or any Tender, and will require security for the due and faithful performance of the Contract.

JAMES MILLIKEN,
Clerk of the Council.

Town Hall, Bangor,
County Down, May 2, 1905.

HONLEY URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

TENDERS FOR COAL AND TAR AND AMMONIACAL LIQUOR.

THE Gas Committee are prepared to receive TENDERS for 2200 Tons of GAS SLACK and 200 Tons of CANNEL, to be delivered free at Honley Railway Station (L. & Y.) during the Year ending June 30, 1906, and also for the purchase of the surplus TAR and LIQUOR produced at the Gas-Works during the same period.

No Tender will necessarily be accepted, and successful Contractors will be required to enter into an agreement for the due performance of the Contract.

Tenders, endorsed, to be delivered, sealed and free of charge, to James Sykes, Esq., LL.B., Clerk to the Council, at 18, Church Street, Honley, on or before Thursday, the 18th day of May, 1905.

By order of the Council,
HARRY MARSDEN,

Gas-Works, Honley,
May 5, 1905.

BRIDGNORTH CORPORATION GAS-WORKS.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas Committee are prepared to receive Sealed TENDERS for the supply of GAS COAL, including carriage to the Bridgnorth Railway Station, for One Year from, or soon after, the end of July next.

Evidence as to quality of Coal must accompany each Tender.

Quantity required: About 2600 Tons, in proportionate deliveries as directed—say, 70 per cent. during winter months, and 30 per cent. during summer months.

Sealed and marked Tenders must be sent to the undersigned not later than Monday, the 15th of May.

The Committee reserve to themselves the right to divide the quantity into two or more contracts, and do not bind themselves to accept the lowest or any Tender.

Official Forms for Tenders are not furnished,

By order,
J. H. COOKSEY,
Town Clerk,
Secretary.

Bridgnorth, April 28, 1905.

THE Llandudno Urban District Council invite TENDERS for the supply of 7000 Tons of Best Screened GAS COAL, capable of producing a minimum of 10,000 Cubic Feet of 18-candle Gas per Ton, to be delivered, carriage paid, between the 1st of July next and the 30th of June, 1906, at the Llandudno Station of the London and North Western Railway, in such quantities and at such periods as may be ordered from time to time.

Forms of Tender may be obtained on application to the undersigned, and only such Tenders as are upon the prescribed Form will be considered.

In every case where the Particulars asked for are not given, the Tenders will be thrown out and not considered.

Tenders must be sent to the undersigned not later than the 2nd day of June next.

The Tender of any Person or Firm who personally, or through an agent, canvasses any of the Officers or Members of the Council will be rejected.

The Council do not bind themselves to accept the lowest or any Tender.

(Signed) ALFRED CONOLLY,
Clerk to the Council.

Town Hall, Llandudno,
May, 1905.

COUNTY BOROUGH OF OLDHAM.

THE Oldham Corporation Gas Works Committee are prepared to receive TENDERS for the supply of about 112,000 Tons of COAL required by them during the Year ending the 30th of June, 1906.

Specifications and Forms of Tender can be obtained on application to Mr. Arthur Andrew, Gas and Water Offices, Oldham, to whom Tenders are to be sent, on or before Tuesday, the 16th of May, 1905.

J. H. HALLSWORTH,
Town Clerk.

Oldham, April, 1905.

URBAN DISTRICT COUNCIL OF PADIHAM.

THE above Council invite Tenders for the supply and delivery of about 6000 Tons of Best Screened GAS COAL in quantities as may be required from the 20th of August, 1905, to the 31st of March, 1907.

Particulars and Forms of Tender may be obtained upon application to the Engineer and Manager, Mr. A. J. Harrison, Gas Office, Inskip Street, Padiham.

Tenders, sealed and endorsed "Tender for Coal," to be delivered up to, and not later than, the 23rd inst.

The Council do not bind themselves to accept the lowest or any Tender.

JAS. C. WADDINGTON,
Clerk to the said Council.

Council Offices,
Mill Street, Padiham,
May 2, 1905.

MONTROSE GASLIGHT COMPANY.

TENDERS FOR COAL.

THE Directors invite Tenders for the supply of about 2500 Tons of Best Quality Screened GAS COAL, delivered f.o.r. or f.o.b. in such quantities as may be required till May 31, 1906.

Sealed Tenders, addressed to the undersigned and endorsed "Tenders for Coal," to be sent in not later than Saturday, the 20th of May.

The Directors reserve to themselves the right to divide the quantity into two or more Contracts, and do not bind themselves to accept the lowest or any Offer.

By order,
A. MACKAY,
Engineer and Manager.

Montrose Gas-Works.

BOROUGH OF TORQUAY.

THE Gas-Works Committee of the Torquay Town Council are prepared to receive TENDERS for the supply of 3000 Tons of approved GAS COAL, delivered free into Stores at the St. Mary Church Gas-Works.

Further Particulars may be had from the Engineer (Mr. F. Chalmers), and Forms on which Tenders must be submitted may be obtained at my Office, Town Hall, Torquay.

Sealed Tenders, endorsed "Tenders for Gas Coals," to be sent to the undersigned not later than Nine a.m. on Tuesday, the 23rd of May, 1905, addressed Town Hall, St. Mary Church, Torquay.

The lowest or any Tender will not necessarily be accepted.

FREDK. S. HEX,
Town Clerk.

May, 1905.

PURIFIERS.

THE Gas Committee of the Coventry Corporation invite TENDERS for the supply and erection, at their Foleshill Works, of Six PURIFIERS, each 30 ft. by 25 ft. by 6 ft. deep, together with Valves and Connections for the same.

Drawings and Specification, together with Schedule of Quantities and Form of Tender, may be obtained on application to the undersigned, and on payment of 30s. (which will not be returned).

The Committee do not bind themselves to accept the lowest or any Tender.

Tenders must be delivered, sealed, to the Chairman of the Gas Committee, Gas-Works, Coventry, not later than the first post on Monday, the 15th day of May, 1905, endorsed "Tender for Purifiers."

FLETCHER W. STEVENSON,
Engineer and General Manager.

Gas-Works, Coventry,
April 28, 1905.

BOROUGH OF RICHMOND WATER-WORKS AND PUBLIC BATHS.

TENDERS FOR SMOKELESS WELSH STEAM COAL.

THE Town Council of the Borough of Richmond (Surrey) invite TENDERS for the supply of about 1450 Tons of best WELSH SMOKELESS COAL, to be delivered in Barges of about 40 Tons alongside the Wharf opposite the Water-Works, Richmond, for One Year from the 1st day of July, 1905, to the 30th day of June, 1906.

The seam and district from which the Coal is to be supplied must be stated in the Tender.

Particulars and Forms of Tender can be obtained of Mr. W. G. Peirce, Borough Water-Works Engineer, at the Water-Works.

No Tender will be recognized unless it is made on the prescribed Form, properly filled up in every respect; and no Expenses or claim will be allowed or paid to any person whether Tendering or not.

The security stipulated by the Public Health Act, 1875, for the due performance of the Contract will be required, and the Contract and Bond will be prepared by the Town Clerk.

Sealed Tenders, endorsed "Tenders for Welsh Coal," and addressed to the Chairman of the Water Committee, Borough of Richmond (Surrey), must be delivered at the Town Clerk's Office, by Ten o'clock on Monday, the 29th of May, 1905.

The Council do not bind themselves to accept the lowest or any Tender.

FREDK. B. SENIOR.
Town Clerk.

Town Clerk's Office, Town Hall,
Richmond (Surrey).

COAL.

THE Ballina Gas Company invite TENDERS for about 800 Tons of best Durham, Yorkshire, Lancashire, or Scotch GAS COAL or NUTS. Quantity of Gas not illuminating power will be considered. C.i.f. and f.o.b. prices must be given.

Further Particulars from J. J. REID, Ballina, Co. MAYO.

THE Directors of the Barking Gas Company, invite TENDERS for the undermentioned Cast-Iron Spigot and Socket PIPES—viz:

4800 Yards of 12-inch Pipes,
5000 Yards of 9-inch Pipes,
5500 Yards of 6-inch Pipes,

together with a quantity of Syphons and Specials.

Further Particulars may be obtained from the undersigned, by whom Tenders will be received not later than the 22nd of May.

W. B. REIDIE,
Manager and Secretary.

TENDER FOR TAR.

THE Directors of the Exmouth Gas Company invite TENDERS for their surplus TAR for Twelve Months from the 1st of June next, at per Ton of 200 Gallons delivered into Contractor's Tanks at the L. & S.W. Railway Company's Sidings, Exmouth Station.

Sealed Tenders, endorsed "Tender for Tar," will be received by the undersigned on or before Tuesday, the 23rd inst.

The Directors do not bind themselves to accept the highest or any Tender.

By order,
JAMES T. FOSTER,
Secretary and Manager.

Gas-Works,
May 4, 1905.

BOROUGH OF ROCHDALE.

TO METER MAKERS AND OTHERS.

THE Gas and Electricity Committee of the above Corporation invite TENDERS for the Supply and Erection at their Gas-Works of a STATION METER to register 80,000 cubic feet per hour.

Tenders, endorsed "Station Meter," and addressed to the Chairman of the Gas and Electricity Committee, must be sent in to me not later than noon on Wednesday, May 17, 1905.

By order,
WM. HENRY HICKSON,
Town Clerk.

Town Hall, Rochdale,
May 5, 1905.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

(INCORPORATED BY ACT OF PARLIAMENT.)

NOTICE is Hereby Given, that the Half-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Association was held at the City Terminus Hotel, Cannon Street, London, E.C., on Tuesday, the 2nd inst.—

JOHN HORSLEY PALMER, Esq., in the Chair,

when the following RESOLUTIONS were unanimously passed:—

"That the Report of the Directors upon the affairs of the Association be received, adopted, and entered upon the Minutes."

"That a Dividend of 5 per cent. for the Half Year ended Dec. 31 last be declared upon the £3,800,000 Capital Stock of the Association, and that the same be payable, free of Income-Tax, on and after the 9th inst."

"That Arthur Lucas, Esq., be re-elected a Director of the Association."

"That Clarence Pigou, Esq., be re-elected a Director of the Association."

"That the Hon. Sir E. Chandos Leigh, K.C., K.C.B., be re-elected a Director of the Association."

"That Joseph Gurney Fox, Esq., be re-elected an Auditor of the Association."

Votes of Thanks were passed to the Directors for their able management of the affairs of the Association, to the Chairman for his conduct in the Chair, and to the Staff in London and on the Continent.

By order of the Board,
ROBERT W. WILSON,
Secretary.

21, Austin Friars, London, E.C.,
May 3, 1905.

BRISTOL GAS COMPANY.

GEO. NICHOLS, HOWES, YOUNG, ALDER, and CO. are instructed to SELL by PUBLIC AUCTION, at their Sale-Room, 49, Broad Street, Bristol, on Thursday, the 8th day of June, 1905, at Two p.m. precisely,

IN LOTS OF £100 EACH, OR LESS,

£20,000

FIVE PER CENT. MAXIMUM GENERAL CAPITAL STOCK

AND

£10,000

NEW DEBENTURE STOCK

(Bearing *INTEREST AT THE RATE OF FOUR POUNDS PER CENTUM PER ANNUM*, payable Half Yearly in June and December),

OF AND IN

THE BRISTOL GAS COMPANY,

Issued by the Company under their Statutory Powers.

The Stock will be sold and Registered in the Books of the Company *free of every expense* to Purchasers thereof.

Full Particulars and Conditions of Sale may be obtained of the AUCTIONEERS, 49, Broad Street, BRISTOL; Mr. T. D. SIBLY, Solicitor, Exchange, BRISTOL; or of

JOHN PHILLIPS,
Secretary.

Chief Office: Canon's Marsh, Bristol.

THE Chippenham Gas Company are prepared to receive TENDERS for Screened and Unscreened COAL for gas-making purposes for a period of Twelve Months commencing on the 1st of July, 1905.

Tenders, addressed to the Chairman and endorsed "Tender for Coal," to be sent in on or before the 24th of May.

H. W. SAVILLE,
Manager and Secretary.

DRONFIELD GASLIGHT AND COKE COMPANY.

THE above Company invite Tenders for 1000 (one thousand) Tons of Best Screened GAS COAL, to be delivered at Dronfield Station and to spread over the Twelve Months ending June 30, 1906. The Coal to be delivered in such quantities and at such times as the Manager may from time to time direct.

The Tenders to be sealed and endorsed "Tender for Gas Coal," and sent to the undersigned on or before Tuesday, the 30th inst.

HAROLD WHITE,
Secretary.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

FELIXSTOWE GAS LIGHT COMPANY.

NEW ISSUE OF £5000 ADDITIONAL ORDINARY STOCK, AND £1000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 16, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

LOWESTOFT WATER AND GAS COMPANY.

NEW ISSUE OF 400 ADDITIONAL ORDINARY £10 SHARES,

Ranking for a Maximum Dividend of 7 per cent., previous Issues of similar Shares now receiving 5¼ per cent.; also

£1000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 16, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

NEW ISSUE OF £15,000 ORDINARY "C" STOCK.

Ranking for a Standard Dividend of 3½ per cent. subject to the Sliding-Scale; the last Dividend on the Company's existing "C" Stock having been at the rate of £5 8s. 6d. per cent. per Annum.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 16, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

GAS AND WATER ORDINARY STOCKS AND SHARES

IN THE

SOUTHEND WATER-WORKS COMPANY.
CHIGWELL, LOUGHTON, AND WOODFORD GAS COMPANY.
WOKINGHAM DISTRICT WATER COMPANY, LIMITED,

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 16, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

ILFORD GAS COMPANY.

NEW ISSUE OF £10,000 ORDINARY "C" STOCK AND £5000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 23, at Two o'clock in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

TENDRING HUNDRED WATER-WORKS COMPANY.

(Supplying Harwich, Dovercourt, Walton-on-Naze, and Frinton-on-Sea.)

NEW ISSUE OF 800 £10 "A" SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 23, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

SALE OF £3000 5 PER CENT. PREFERENCE SHARES
IN THE
BRIXHAM GAS COMPANY.

MR. F. S. DUGDALL is instructed by the Directors to SELL BY AUCTION, at the Market Hall, Brixham, Devon, on Saturday, the 13th of May, 1905, at Three o'clock precisely, in separate Lots, 300 PREFERENCE SHARES of £10 each, entitling the holders to a cumulative dividend of 5 per cent., which will be paid in priority to the dividends on the Ordinary Shares. The Standard Price of Gas is 4s. per 1000 cubic feet. The Company was established in 1898, and incorporated in 1904 by special Act of Parliament. The authorized capital is £20,000, of which £8000 remains to be issued.

The sale of Gas for 1904 was 8,903,000 cubic feet, an increase of 1,283,700 over the previous year.

The new capital is required, among other things, to pay for further Extension rendered necessary by the rapid growth of the demand for Gas in the District. It will be issued free of expense to purchasers.

Detailed Particulars of Sale, with Form of Instructions to purchase, obtainable, post free, of Messrs. SCHULTZ, COMINS, & Co., 50, CANNON STREET, E.C., or of the AUCTIONEER, Brixham, DEVON.

BUENOS AYRES (NEW) GAS COMPANY, LIMITED.

NOTICE is Hereby Given, that the Shareholders, at their Ordinary General Meeting held this day, have DECLARED A DIVIDEND of 7 per cent. for the Year ended December 31, 1904, of which 3 per cent. was distributed in October, 1904, by way of Interim dividend; leaving the balance of 4 per cent. (8s. per share) to be paid forthwith, free of income-tax.

And Notice is Hereby Further Given, to the holders of Share Warrants to bearer of this Company, that Coupon No. 30 is payable by the Company's Bankers, the Union of London and Smiths Bank, Limited, 50, Cornhill, E.C., at the rate of 8s. per Coupon. Coupons must be left with the Bankers three clear days for Examination.

By order,
J. M. MACMORRAN,
Secretary.

1, East India Avenue,
Leadenhall Street, E.C.,
May 4, 1905.

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Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)
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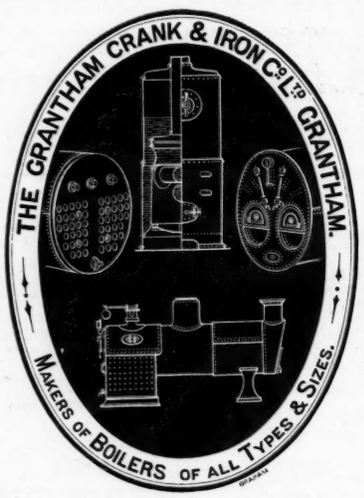
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.



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more Imperial Cookers sold in 1904 than in previous Year.
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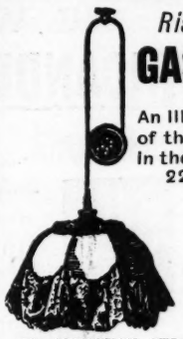
GAS PENDANT.



An Illustrated Description of this Pendant appeared in the "Journal" for Nov. 22, 1904 (page 599).

Write for full Particulars to the "HANWELL" Pendant Company,
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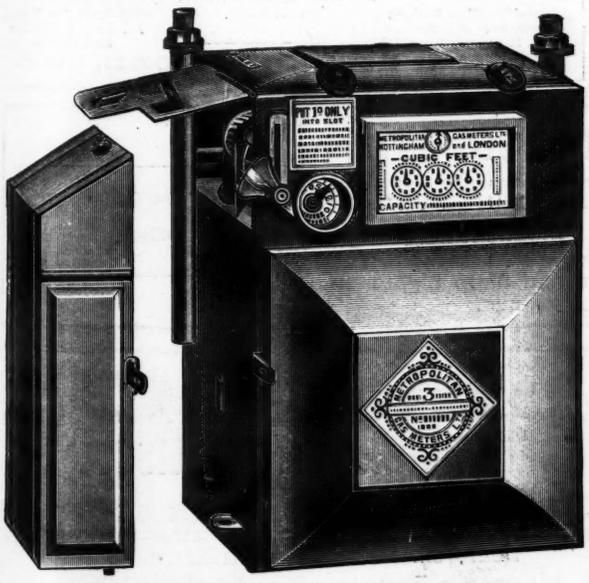

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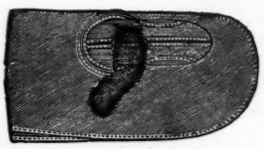

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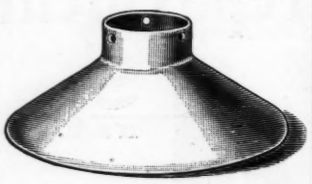

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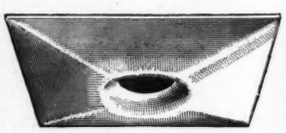

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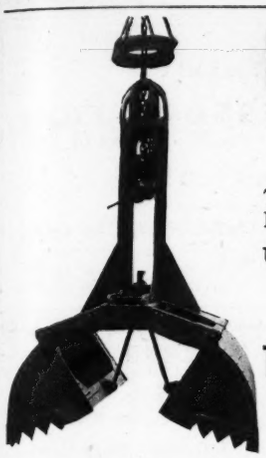

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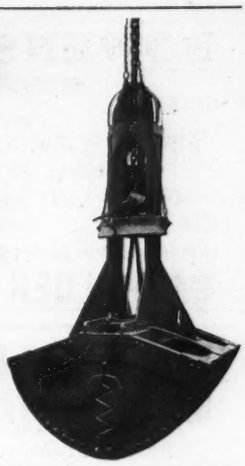

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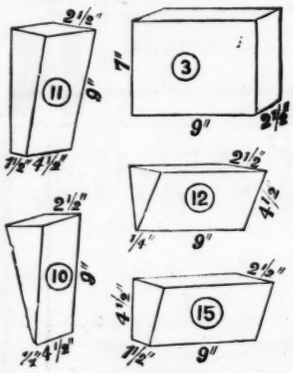

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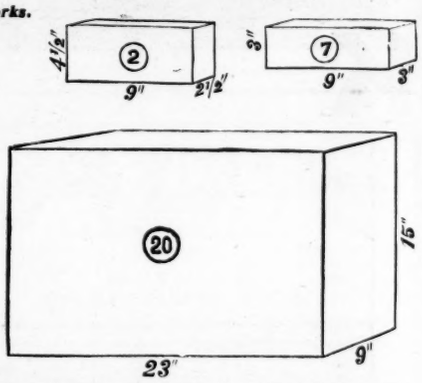

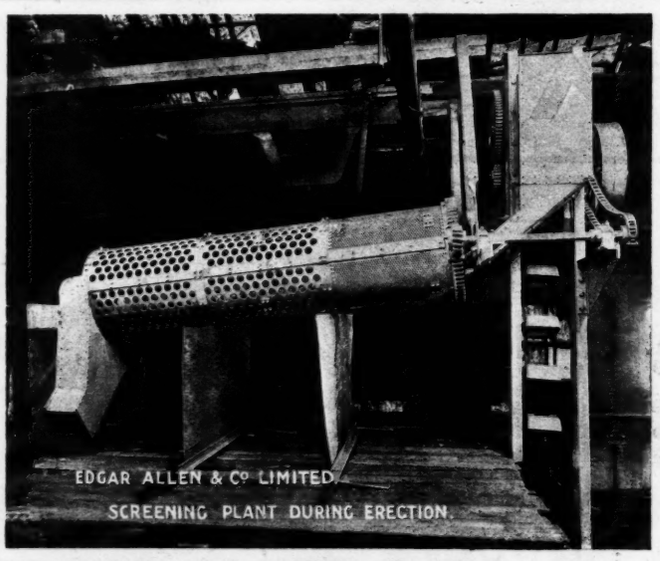

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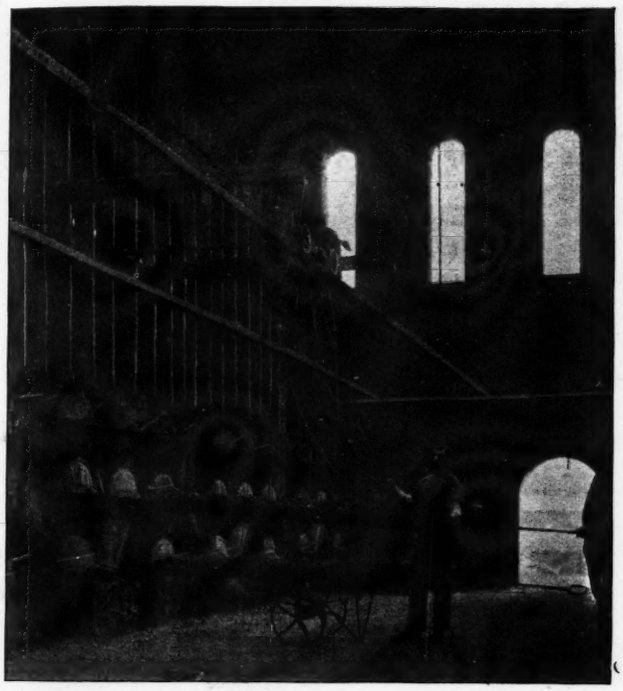

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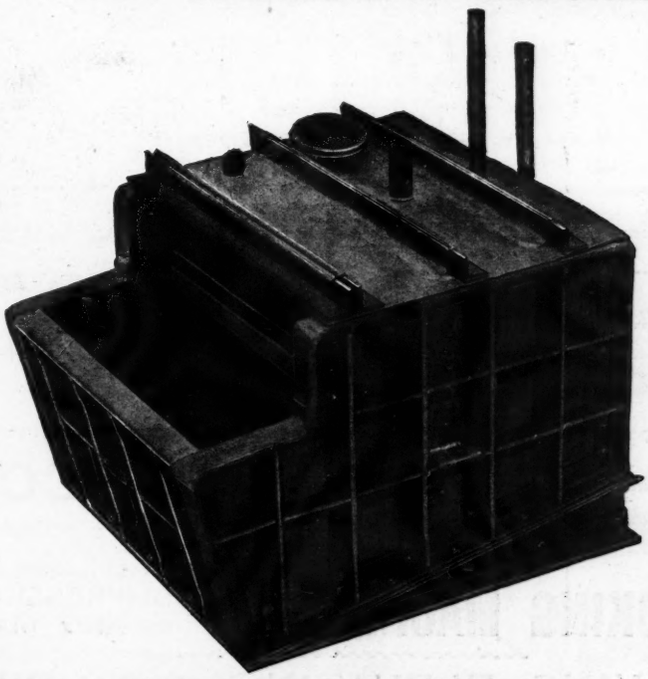

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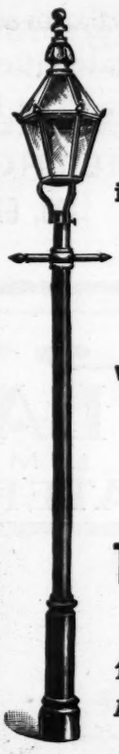

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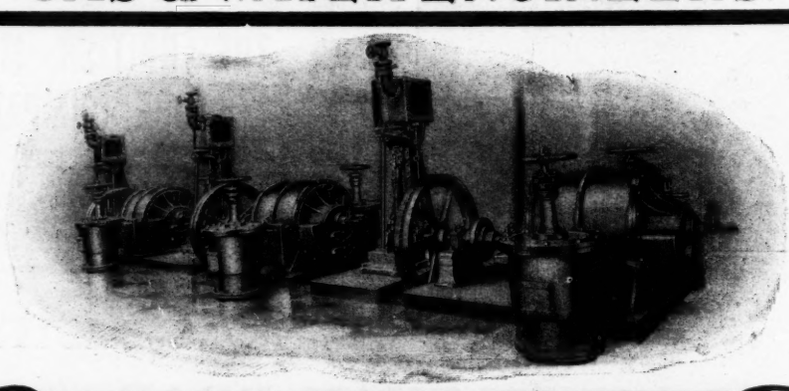

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